Fed Coal

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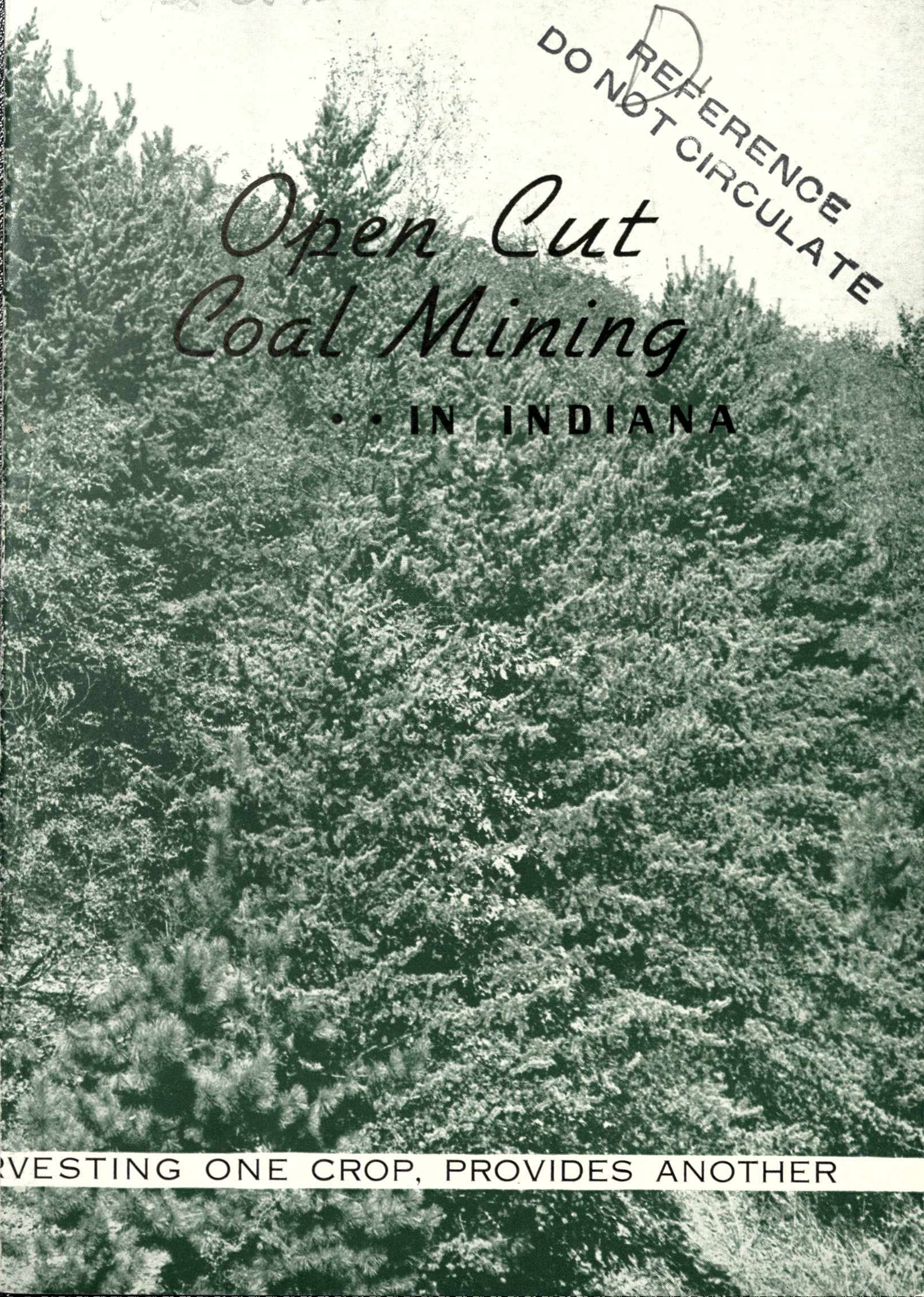
# Open Cut Coal Mining

## . . IN INDIANA



RVESTING ONE CROP, PROVIDES ANOTHER

# THE PICTURE ON THE COVER . . .

. . . The vigorous growth of timber depicted here is located a few miles south of Dugger, Indiana, on land that 20 years ago was eroded and abandoned farms not salable at $25.00 an acre. These trees are now valuable pulpwood. In ten more years they can be harvested as prime timber.

# OPEN CUT
# COAL MINING
## IN INDIANA

◆

*Harvesting One Crop, Providing Another*

◆

THE INDIANA COAL PRODUCERS ASSOCIATION
524 GRAND OPERA HOUSE BUILDING
TERRE HAUTE, INDIANA

# *FOREWORD*

THE READER of this booklet will find that coal mining by the Open Cut Method is not only a branch of the Industry that is vital to the industrial economy of the State, but also does important and continuing conservation work with a scientific land use program, which through the years, will improve rather than destroy mined-over land. The pictures speak for themselves. The articles were written by people who are personally familiar with the conservation work that is being done, most of them not in any way connected with the coal industry.

Generally speaking, the lands already mined may be put to several uses—Forestry, Pasture, Recreation, Wild-Life, Real Estate Development. The Indiana Coal Producers Association through a professional staff is assisting its member companies in putting their lands to the best possible use, keeping in mind owners' needs, community benefits, State and national welfare.

There is herein depicted by words and pictures some of the accomplishments and some of the obstacles to future endeavor, as well as the economic importance of Open Cut Mining to the State of Indiana.

The Indiana Coal Producers Association is deeply appreciative of the efforts of the Indiana Department of Conservation, Indiana Farm Bureau, Purdue University and other agencies for the assistance given in determining the proper use of the land and in helping to carry the development to a successful conclusion. To the authors of the various articles in this booklet the Association is deeply grateful. Their views as citizens of Indiana, are a true reflection of informed public opinion concerning Open Cut Coal Mining in its continuing conservation program.

# Land Use Is Planned Scientifically As Adjunct to Open Cut Coal Mining

By L. E. SAWYER, *Director,*
*Division of Forestry and Reclamation, Indiana Coal Producers Association*

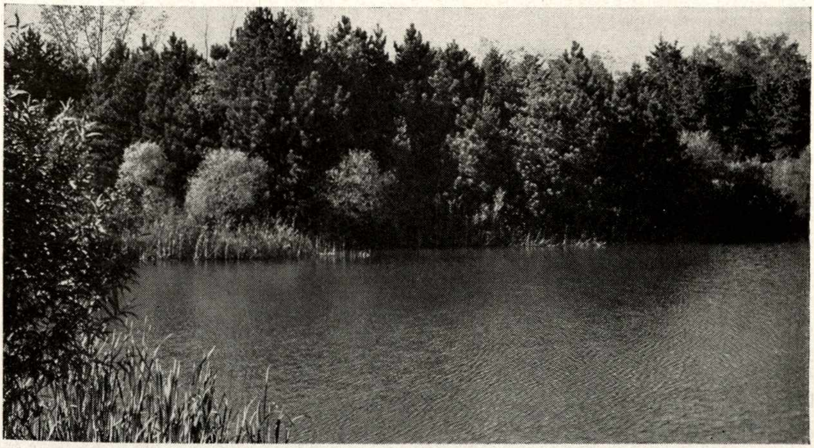
THE REVEGETATION of mined-out areas, through the planting of forest trees, was started by some of the more far-sighted Open Cut mine operators in Indiana in the spring of 1918. Complete records are not available of all the early plantings, but those on which records can be obtained show that by 1926 planting had been started by the Enos Coal Mining Company, Patoka Coal Company (now a part of Ayrshire Collieries Corporation), Maumee Collieries Company, and Central Indiana Coal Company.

Between 1926 and 1930 other companies began taking an active part in that program. By 1930 nine of the then large Open Cut mining companies were committed to a program of planting on their mined-out lands. The results of some of these early plantings are outstanding. Survival of most species has been good and the growth rates have exceeded those of the same species planted on adjacent undisturbed land.

No previous reforestation had ever been made on land of that character so there was no backlog of practical experience to guide the foresters called upon to recommend the species of trees to be used. Conifers were set out in the largest numbers and included the native red pine, white pine, jack pine, spruce, and American larch, as well as the then popular introduced Scotch and Oriental pines and Chinese arborvitae. Hardwoods, including black locust, black walnut, tulip poplar, chestnut oak, catalpa and red oak were used in smaller numbers.

The jack, red and white pines are

*This Clay County scene is typical of the results obtained from Indiana Open Cut mine owners' early plantings. The trees pictured were planted in* 1933-34. *They are already marketable for pulpwood or props and with a few more years' growth will supply saw timber to replenish Indiana's dwindling supply.*

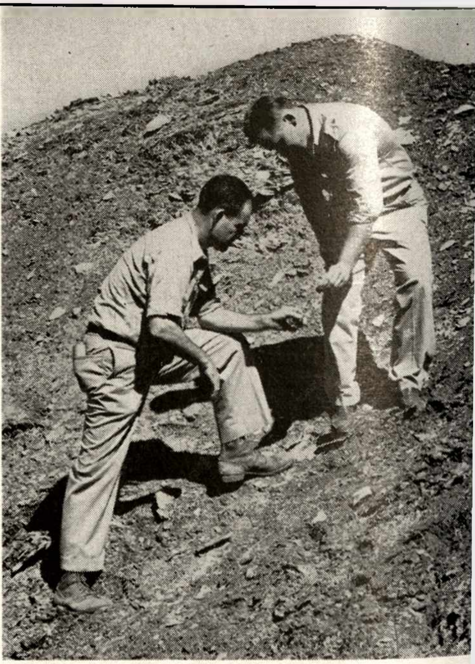


the outstanding conifers in the plantings, in that order. All of these trees have made extremely rapid growth. The majority of trees in these old plantings range from 3 to 6 inches in diameter and 35 to 40 feet tall. Especially thrifty individuals, over 6 inches in diameter and 45 feet or more in height, are not uncommon. The jack pines, an early seed producer, have been bearing viable seed for several years. Natural reproduction of these species, ranging from 1-year old seedlings to trees 7 feet in height, is common in all areas where they have been planted, even as recently as 1934.

In 1941, partly as a result of attention centered on these voluntary experimental plantings, legislation was obtained requiring every Open Cut mine operator to revegetate the land from which the coal had been removed.

The revegetation program now being carried on by the members of the Indiana Coal Producers Association is not a tree-planting program aimed at keeping down adverse public opinion. The program is built around a policy of proper land use determined by soil tests to ascertain the uses to which the waste banks are best adapted. Mined lands that are fertile enough and the adjacent unmined areas are devoted to pasture. On areas of higher fertility not large enough to develop for pasture, seedlings of the more rapidly growing deciduous trees are being planted. Mined areas of lower fertility are planted to a variety of conifers.

In addition to the trees that are being planted nature has taken an active hand in the revegetation. Extensive areas are covered with volunteer stands of cottonwood and sycamore, with smaller quantities of sweet gum, ash, elm, black cherry and in the vicinity of existing wooded areas, with oaks and hickories. These trees are doing well. One area of 180 acres, mined in 1926, now supports a heavy stand of cottonwood and sycamore. Most are between 10 and 14 inches in diameter.



*Scientific soil tests indicate growth possibilities and proper planting time. Jack Winchell (right), District Forester of Indiana's Department of Conservation and L. E. Sawyer, sample land in Greene County.*

There are many problems that remain to be solved before these mined-out lands and other holdings of the companies can produce the maximum of benefit to the communities near which they are located and to the companies that own them. Information gained from the program of early plantings, from cooperation with the Division of Forestry of the Indiana Department of Conservation, and the Departments of Forestry and Agronomy at Purdue University, from experimental plots established in cooperation with the Central States Forest Experiment Station, and from a graduate research fellowship established by the Association at Purdue, will solve many of these problems.

# State Forester Praises Progress In Restoration of Lumber Industry

By RALPH F. WILCOX, *Indiana State Forester*

A MAJOR concern of the Indiana Conservation Department is the welfare of Indiana forest lands, for properly planned, protected and controlled, these lands can restore to some degree, Indiana's lumber industry to the importance it once held. To this extent, therefore, the Division of Forestry in the Indiana Conservation Department, representing the people of the State of Indiana, is a keenly interested partner in the reforestation work of the State's Open Cut mine owners.

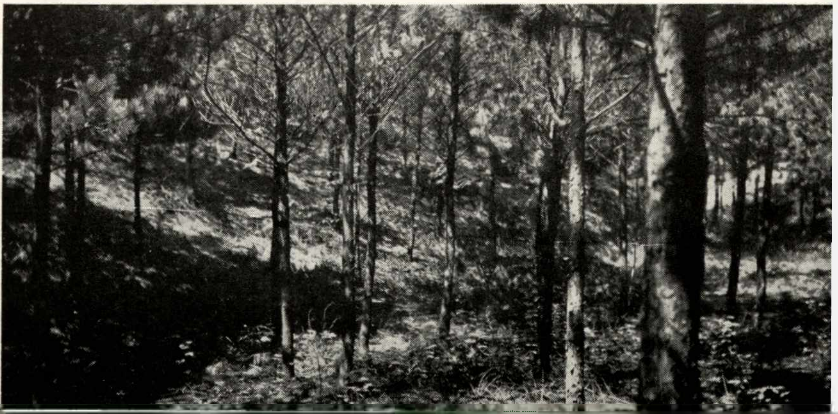
A considerable area of the land which is being mined by the Open Cut method is potential forest land to begin with. The areas now being touched by the mining operations in many cases are to quite a degree depleted from an agricultural crop standpoint because of lack of good topsoil, wasteful farming practices that have worn out the land, and natural erosion that carried away the soil after the original forests were cut. Cost of rehabilitation by lime, fertilizer, cover crops and drainage does not appear to be economically feasible. Other areas from which forests had not been cleared are in a sorry state because of overcutting of timber, the burning over of large areas, presence of cull and weed trees, or grazing by livestock. The latter practice, through destruction of the young growth, is more harmful to a forest area than is a forest fire, except that it takes longer for the final ruin to become apparent.

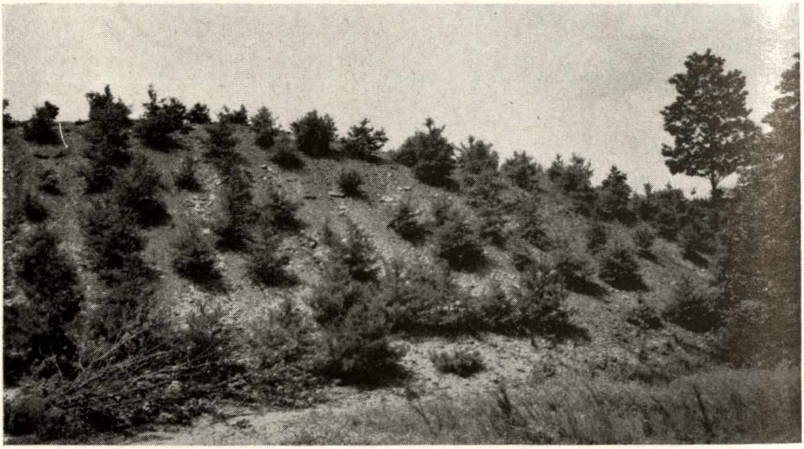
The planting program of the Open Cut mine owners is putting most of the land they mine back into condition as productive forest land. This will restore the usefulness of the land and assist in perpetuating the important timber industry in Indiana. Continuing crops of merchantable timber, properly cut, will contribute greatly to the economy of the surrounding areas.

Because of the importance of the timber industry to Indiana, the Conservation Department has obtained two large areas of mined land which are now parts of the State forest system. Just recently a small pulpwood crop was harvested by the State from one of these tracts and the experiment proved that such a crop is profitable.

There are several stands of timber now ready to be harvested on land owned by Open Cut mining companies as a result of the early plant-

*Red and Jack pines 12 years old transform mined areas into woodland scenes like this, a man-made forest on Open Cut mined land in Pike County.*





*Four years after planting trees cover the mine banks with the verdure of budding forests and natural reproduction has begun. Pictured are trees planted in Pike County in* 1941, *photographed in July,* 1945.

ing experiments they conducted. The value of these timber crops will increase greatly each year because of the scientifically planned plantings that are now being made by the industry. Through the assistance given the Conservation Department by the Division of Forestry and Reclamation of the Indiana Coal Producers Association the hit or miss methods of early planting days have been supplanted by orderly, studied methods. These insure the use of species suited to the soil, carefully placed to obtain maximum use of the areas.

Purchase of planting stock from the State nurseries has helped the State maintain this valuable branch of the Division of Forestry and also has provided the mine owners with homegrown species of trees whose survival on the mined areas for the most part, is certain.

Open Cut mining in one sense of the word is helping to conserve the State's mineral resources through mining methods that eliminate waste and recover virtually 100 percent of the coal uncovered by the shovels and drag lines. It is gratifying that the harvesting of a resource, namely coal, does not stop there, however. Future generations of Indiana will benefit from the second natural resource which is now being reestablished on the same lands, for timber is a natural resource which has suffered greatly from wasteful methods which have seriously impaired good forest production.

The Indiana Coal Producers Association slogan—"Harvesting One Crop and Providing Another"—is one which might well apply to the activities of all persons who profit from the utilization of natural resources.

Whether coal is mined or not by the Open Cut method obviously is not within the province of the Division of Forestry to decide. It is however within the scope of the State Division of Forestry to assist and cooperate with the Division of Forestry and Reclamation of the Indiana Coal Producers Association in its organized effort to reforest and rehabilitate the residual mined areas of its member companies. It is gratifying to state that such mutual assistance and cooperation does exist.

# Time, Experience Are Big Factors in Revegetation Plan

By DANIEL DENUYL
*Associate in Forestry,
Purdue University*

TIME is the most important factor in the revegetation of land turned back to permit recovery of coal by the Open Cut mining method. Not only do tree crops require years for their production, but the soil itself needs time to reach the proper state to support vegetation.

Experience has shown that it is not possible to send planting crews in immediately behind the miners and their machinery. Instead, nature insists upon an interval in which to prepare the soil brought up to the surface by the mining. Then, given sufficient time, nature itself would provide cover on these man-made mine banks.

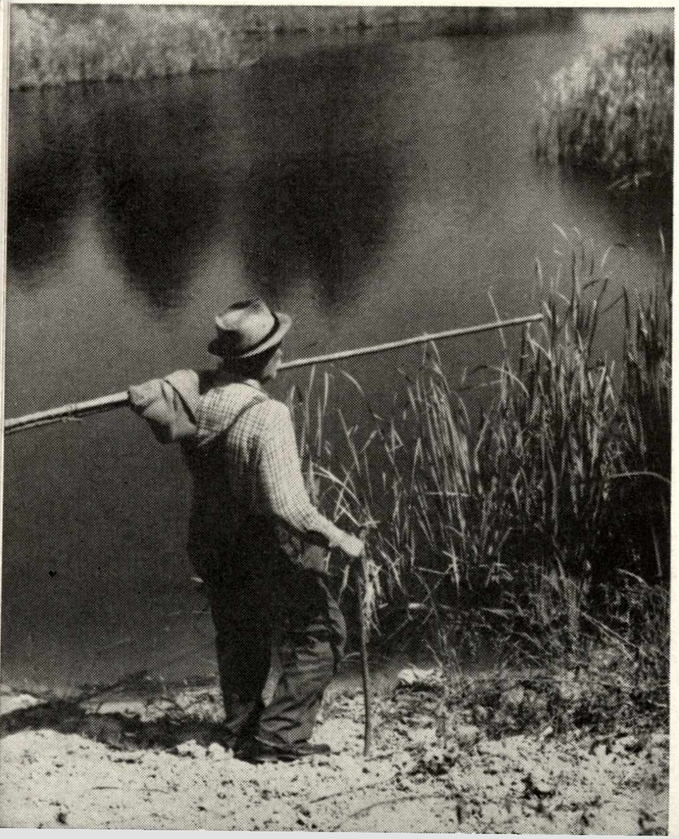
However, man is impatient and so trees are planted to hasten the establishment of forest cover on such sites. The trees must be properly planted and cared for as the particular species require in order that a good crop of forest products can be grown.

Experience has provided much information on mine bank plantings but much still remains to be learned about these man-made forests and much more experimental work must be done before maximum tree crops can be obtained.

The mine owners seem determined to establish forests on the mine bank areas and are cooperating with forestry and soil experts in the development of their revegetation program.

*Man-made forests have become so dense that it is difficult to obtain photographs in their interiors. Here is an example of the growth on Clay County land that was reforested in 1927. Twenty years of experiments show growth is more rapid, more luxurious on mined land than on adjacent undisturbed soil.*

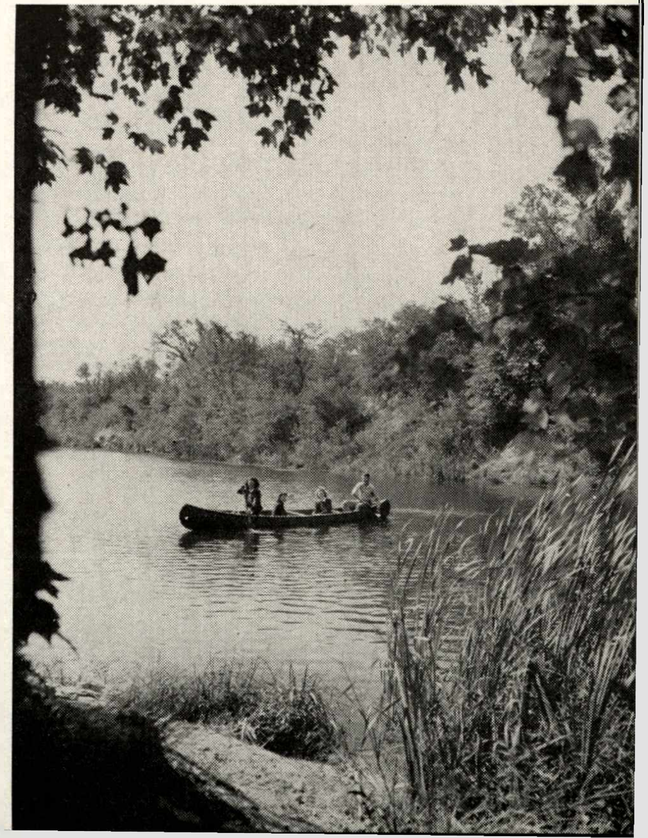
# MINED-OVER LANDS PROVIDE NEW PARKS, RECREATION SPOTS FOR SOUTHWESTERN INDIANA

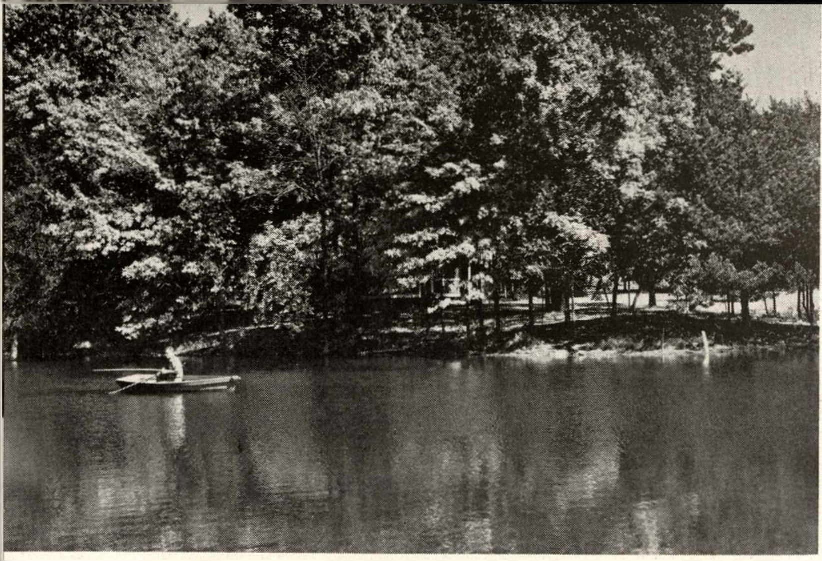


*An inviting recreation spot (upper right) is built along the shores of a Greene County lake created by Open Cut coal mining. Its owners enjoy a carefree Summer life just off a good road and but a few miles from urban centers.*

*At Linton many community activities center around the Community Cabin pictured at the left above. The community house is built at the edge of a 600-acre tract of Open Cut mined land which with its picturesque lakes, rearing ponds and woodlands is now a public park.*

*Boating on the clear, blue waters of man-made lakes surrounded by tree-covered slopes appeals to young and old alike as the canoeists demonstrate in the picture at the right. The lakes also appeal to the true fisherman whether he is outfitted with costly equipment or relies upon a bamboo pole and a worm as does the elderly Hoosier at the left, headed for his favorite spot. It is a spit of land jutting into one of the lakes created by Open Cut mining, and it is full of big ones.*





*Boating and fishing are Summer time lures for those having access to the lands and lakes of Open Cut mined territory. Owners would open many of their properties for general public use were it not for existing liability laws.*

# Liberalized Liability Laws Would Open Large Areas to Public Use

### By A. S. THOMAS,

*Director, Tax and Legislative Department,*
*Indiana Farm Bureau*

PRESENT Indiana law making owners liable for legal action in connection with accidents occurring on their properties prevents thousands of Hoosiers from enjoying the recreational facilities potentially present on land mined and reforested by the state's Open Cut coal mining industry. This is particularly unfortunate at the present time when the public's interest in such matters is evidenced by the popularity of the Indiana State Park system and the constant efforts to widen its scope. Mined areas could provide equally interesting and valuable facilities.

In southwestern Indiana hundreds of acres of land have been reforested and scores of lakes have been created by Open Cut coal mining companies. Some of these areas have been opened for recreational use through municipalities or organizations that assume responsibility by taking title to the land by purchase, lease or gift. However there is much land on which the mining companies desire to retain title but which, I am sure, they would throw open for public recreational use if they could be assured freedom from nuisance suits. There is nothing selfish in this viewpoint, since it is evident that anyone who creates recreational facilities and makes them available for free public use has performed a notable public service and should not be subjected to nuisance suits and legal penalties in return.

I think it is very necessary that a law be drafted which will encourage the creation of lakes and recreational areas on properties such as those owned by the mining companies. The 1945 session of the General Assembly did enact such a bill but it was too drastic and did not receive final approval.

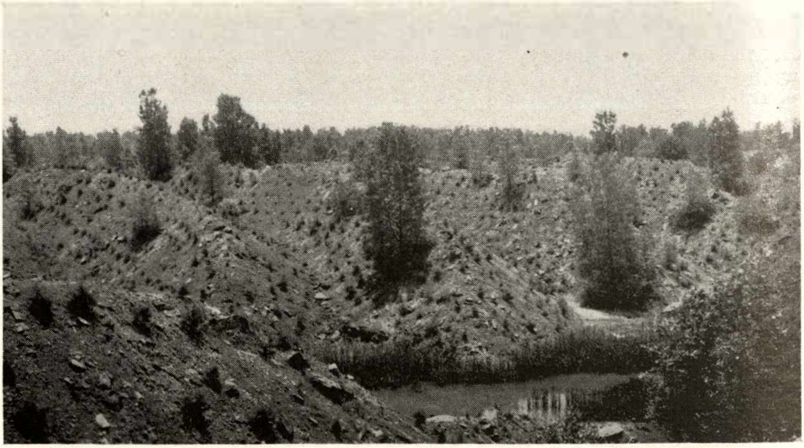
I believe suitable legislation by the 1947 General Assembly would be in the public interest since it would eventually open to the public excellent areas for hunting, fishing, boating, swimming and other outdoor activities. Many persons privileged to use such areas by virtue of membership in organizations controlling them travel great distances to avail themselves of the opportunity. It seems like a waste of a great Hoosier asset to have similar use by all members of nearby communities prevented because of present liability laws.

# Open Cut Mining Touches Only Tiny Fraction of Land

DESPITE the importance of the Open Cut mining industry to Indiana, coal suitable for recovery by this process is found in only 11 counties. The land area involved in past, present or contemplated operations with present mining methods is *less than one-fourth of one percent* of the state's *total* area.

The amount of land owned or leased by Open Cut mining companies is not a measure of the area to be mined. Often portions of tracts so controlled contain no coal; other portions have coal of insufficient quantity or too deeply buried to be mined profitably. In these cases the land will be used only in connection with the companies' revegetation and reclamation program.

*Here is a picturesque man-made lake, one of three on a 110-acre tract of Vigo County land mined just four years ago. The tract has been obtained by the American Legion Post at Riley which will build its home on a high knoll affording this view.*



*Nature starts its own reforestation program, as these large volunteer trees show, but its plantings lack density and regularity so Indiana Open Cut mine owners purchase seedlings from Indiana State Nurseries which are planted in a pattern scientifically designed to best utilize every portion of mined land. Here the seedlings dot the landscape at six-foot intervals.*

# Trees Planted at Mine Companies' Expense Already Yielding Cash Crop

*Condensed from Terre Haute Star, Nov.* 11, 1946

TREES GROWN on Indiana's Open Cut mined lands are now being harvested for pulpwood from which paper will be manufactured in American mills to help alleviate the acute worldwide paper shortage.

First crop of pulpwood from mined over areas was cut during the fall of 1946 by the Division of Forestry of the Indiana Department of Conservation. Profit from its sale went directly to the State of Indiana.

The wood just cut came from the Greene-Sullivan State Forest one mile east and about three-fourths of a mile north of Bucktown in Greene County. The land was mined in 1928 and 1929 by the Central Indiana Coal Company and had been reforested by its owners during the early years of the voluntary reforestation program. The Department of Conservation obtained the 1700-acre area from the Central Indiana Coal Company as a gift to the state's conservation program.

The forest is now on a revenue-producing basis and, although less than 18 years old, it will be able to "take care of itself" through natural reproduction of the sycamores, maples, cottonwoods and other trees that are well-established there, according to District Forester S. J. Hensler.

Periodic harvesting of the pulpwood will serve to thin out the stand and permit better growth of the younger trees. It is proving the economic wisdom of providing this new crop where the land already has yielded coal, one of the state's greatest natural resources.

# Open Cut Mine Owners Buy One-Third Of All Stock Grown in State Nurseries

By RICHARD W. RAMBO, *Indiana State Nurseryman*

TWENTY-ONE member companies of the Indiana Coal Producers Association are among the biggest customers of the Indiana State Nurseries, slightly over one-third of the entire output having been purchased for the 1947 planting season. To reforest 2,500 acres of land already tested, mapped and approved for planting by the Division of Forestry of the Indiana Department of Conservation, the Association has contracted for 2,242,000 seedlings.

This is the first time in the history of the Association's organized planting that it has been possible for the State's Nurseries to provide all of the required planting stock. The Association now places its orders four years in advance of delivery date to permit the State to plan its nursery production to meet the needs of one of its largest cash customers.

State Nursery stock will be supplemented in the 1947 planting season with direct seeding of walnuts to make a grand total of 2,247,000 plantings. The land to be reforested is approximately 500 acres more than the area covered by mining operations in the preceding fiscal year.

An all-time record of 2,600,000 plantings was set in 1946 by members of the Association, the high figures having been obtained in overcoming the wartime lags caused by shortages of labor and planting stock.

A review of the figures for total nursery stock produced by State Nurseries in Indiana and stock purchased by the Indiana Coal Producers Association in the past few years is of interest, as follows:

| *Year* | *Total Production* | *Used by Coal Companies* |
|---|---|---|
| 1944 | 2,236,000 | 733,300 |
| 1945 | 2,995,600 | 1,354,200 |
| 1946 | 4,262,800 | 1,729,500 |
| 1947 | 5,666,600 | 2,242,000 |
| Totals | 15,161,000 | 6,059,000 |

*These trees, 6 inches in diameter, 35 feet tall, grow on Pike County land mined in 1933. All planting on mined land is done at the expense of the mine owner as a private enterprise. The state does none of the planting, bears none of the expense.*

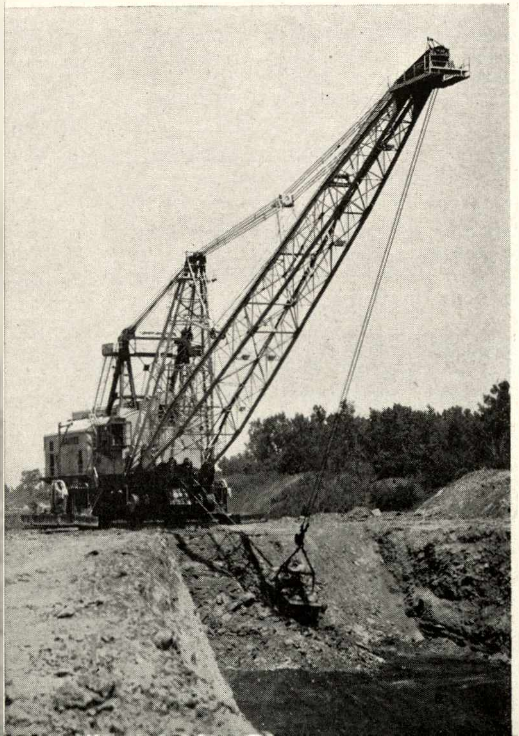
# Coal Recovered by Open Cut Mining Otherwise Would be Lost to Posterity

By LAFE STEWART
*Chief Engineer, Maumee Collieries Company*

OPEN CUT mining is the process of removing the relatively shallow earth and rock covering from mineral deposits and the recovery of these natural mineral resources by direct mining or quarrying from the exposed seams. The oldest form of mining known, the Open Cut process is not peculiar to the coal industry but is used universally in the production of limestone, iron ore, silica, clay, shale, gravel, sand and other minerals.

Like other minerals, coal is found in layers or seams. Where these seams lie close to the surface underground mining is physically and economically impossible because the strata above are so weak that the expense of pillaring and timbering to support the overlying surface is prohibitive. Increased accidents and inability to utilize modern mechanical equipment combine to raise underground production costs of these shallow mines so that coal so produced cannot compete with other fuels. As a result much unmined coal had been abandoned.

*In Open Cut mining the overlying earth and rock are removed by large electrically-operated draglines (pictured) or shovels. The seam of coal visible in the foreground then is recovered by smaller loading shovels.*



Thus there would have been left hundreds of millions of tons of coal —one of the greatest of nature's resources—unrecovered and lost to posterity forever, were it not for the modern Open Cut method.

In the Open Cut process the overburden of earth and shale or rock is turned back by large electrically-operated shovels or draglines which work forward and back in successive cuts of varying widths. The coal thus exposed is mined by smaller loading shovels, which pick up the fuel and deposit it in trucks for transportation to the preparation plant. There the coal is crushed, washed and screened to obtain marketable sizes of fuel, free from impurities.

Because the entire Open Cut process is performed in the open and with no need for leaving supporting pillars of coal, it recovers virtually 100 percent of the coal deposit.

Open Cut mining is a process termed by the U. S. Bureau of Mines ". . . . a means of preventing waste of a natural resource which cannot be replaced." In Indiana it is even more. Through its reclamation program the Open Cut mining industry is providing a natural resource of timber to replace the mineral resource it has harvested.

# 230 Years' Crops Required to Equal Coal in One Acre

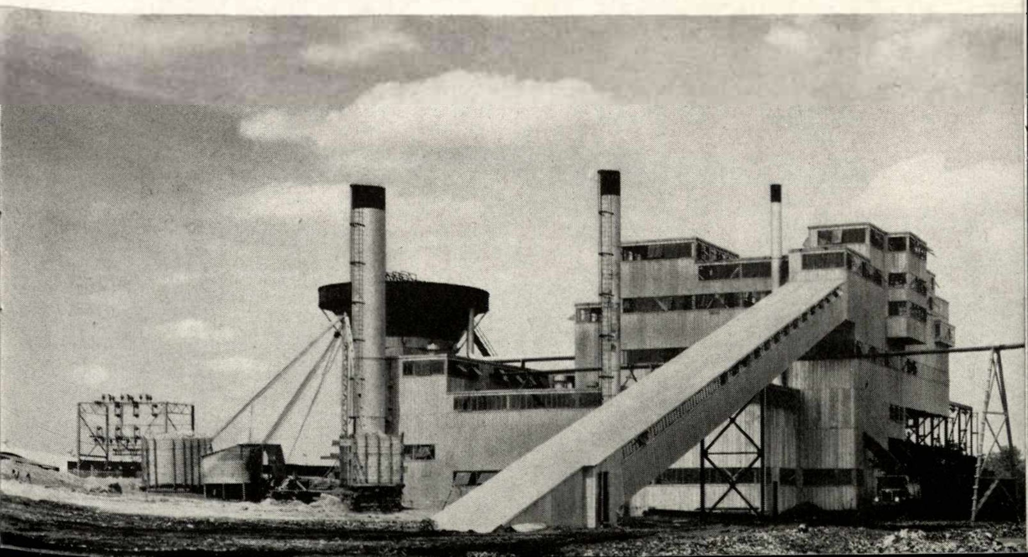
VALUE of the average amount of coal produced from an acre of Indiana land by the Open Cut process is more than 200 times the value of the average annual farm crop on the same land. A single acre having a five-foot seam containing 7,000 tons of merchantable coal creates $16,000.00 of original wealth at present prices for coal. This wealth channels out through the community in salaries, wages, materials, supplies, freight and taxes, all to the economic welfare of the State and the Nation. The same acre planted in corn will return only about $70 at present values. *It would take* 230 *years* at these rates for one acre of land to produce as much wealth by agricultural methods as is now produced by Open Cut coal mining.

# Coal Mining Basic Indiana Industry; All Share Benefits

By C. C. LYDICK
*Managing Director,*
*Coal Trade Association of Indiana*

COAL MINING, with a capital investment of more than 100 million dollars, and an annual payroll of 30 million dollars, is Indiana's basic industry. Its importance to the State's economy may be measured in two ways. First, it creates original wealth through the recovery of a natural resource — original wealth amounting to approximately 60 million dollars annually poured into the streams of Indiana commerce. Second, it provides the fuel upon which all industry is dependent and without which few modern industrial processes could be carried on. The benefits from the latter

*Coal from the open pit goes to modern preparation plants like this one where it is carefully screened, washed, graded and treated for the particular use designated by its purchaser. Coming from the same seams, it is the same coal in every respect as that mined in Indiana by any other method.*



phase are so vast as to be almost incalculable.

Indiana's coal production ranks sixth in the nation. During 1945, Indiana mines produced 25,500,000 tons of coal, 55 percent by the Open Cut method and 45 percent from deep mines. This coal, at an average f. o. b. mine price of $2.31 a ton, was worth nearly 60 million dollars. With approximately 90 percent of the coal transported to the consumer by rail, and estimating an average freight rate of $1.75, the rail transportation cost added nearly 40 million dollars to the industry's economic importance to the State. The remaining 10 percent, handled by trucks at an average transportation cost of approximately $1.00 per ton, sent over 2½ million dollars more into the State's business channels.

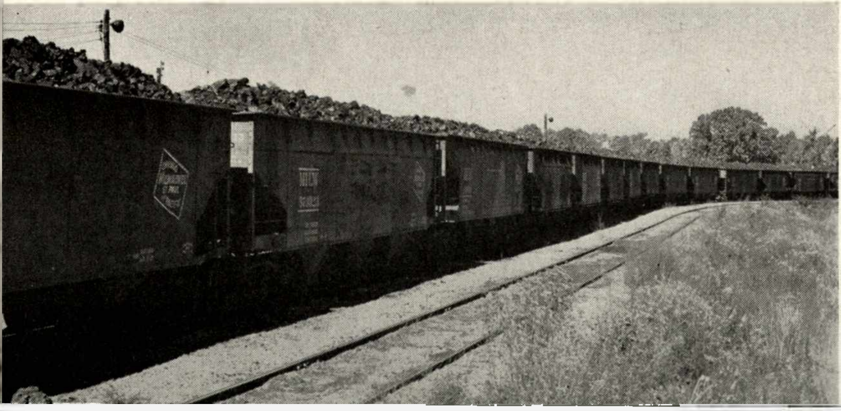
Indiana coal is a general utility fuel, suitable for heating, steam power, and other commercial purposes. Practically all of the coal mined in the State—certainly 100 percent of that mined by the larger companies—is carefully washed or otherwise cleaned, graded and treated for the particular purpose it is to serve. It is widely sought for industrial use in other states and during 1945 approximately 65 percent of the State's production was shipped outside Indiana.

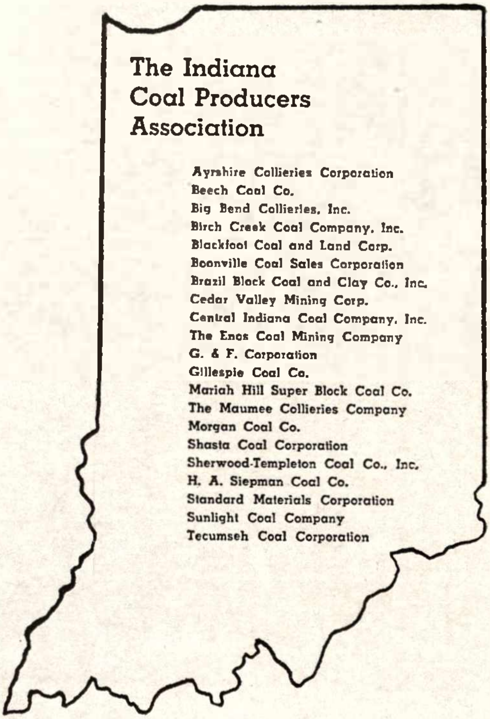
However, outside markets are highly competitive and the extent to which they will use Indiana coal is dependent upon the delivered cost of the fuel. Thus any factor tending to increase the cost of Indiana coal will tend to decrease the outside markets. The cost of labor and machinery used in coal production is roughly equal in all coal production areas. Other and more variable factors which restrict Indiana's coal production are freight rates, taxation, and additional costs that might be saddled on the industry through punitive legislation.

Increased production costs caused by increase in any of these variable factors means a corresponding higher cost to the consumer and a restriction of markets for Indiana coal. This in turn will lower the production total, resulting in higher unit production cost and a continuing spiral of increased cost to the consumer. The resulting decrease in coal output would be a serious blow to the entire economy of the State for it would cause reduced employment, lower tax returns and stagnation of capital investment. Its attendant effect upon community and state business totals would be staggering and would affect the pocketbook of every resident of Indiana. The 30-million-dollar payroll covering 10,000 employes of the coal industry in Indiana is a material factor in our economic welfare.

*Coal is basic. What hurts coal, hurts everyone and what helps coal, helps us all.*

*From the preparation plant the coal flows to homes and industries; the wealth it creates benefits every citizen of Indiana.*





## The Indiana Coal Producers Association

Ayrshire Collieries Corporation
Beech Coal Co.
Big Bend Collieries, Inc.
Birch Creek Coal Company, Inc.
Blackfoot Coal and Land Corp.
Boonville Coal Sales Corporation
Brazil Block Coal and Clay Co., Inc.
Cedar Valley Mining Corp.
Central Indiana Coal Company, Inc.
The Enos Coal Mining Company
G. & F. Corporation
Gillespie Coal Co.
Mariah Hill Super Block Coal Co.
The Maumee Collieries Company
Morgan Coal Co.
Shasta Coal Corporation
Sherwood-Templeton Coal Co., Inc.
H. A. Siepman Coal Co.
Standard Materials Corporation
Sunlight Coal Company
Tecumseh Coal Corporation

MOORE-LANGEN—TERRE HAUTE

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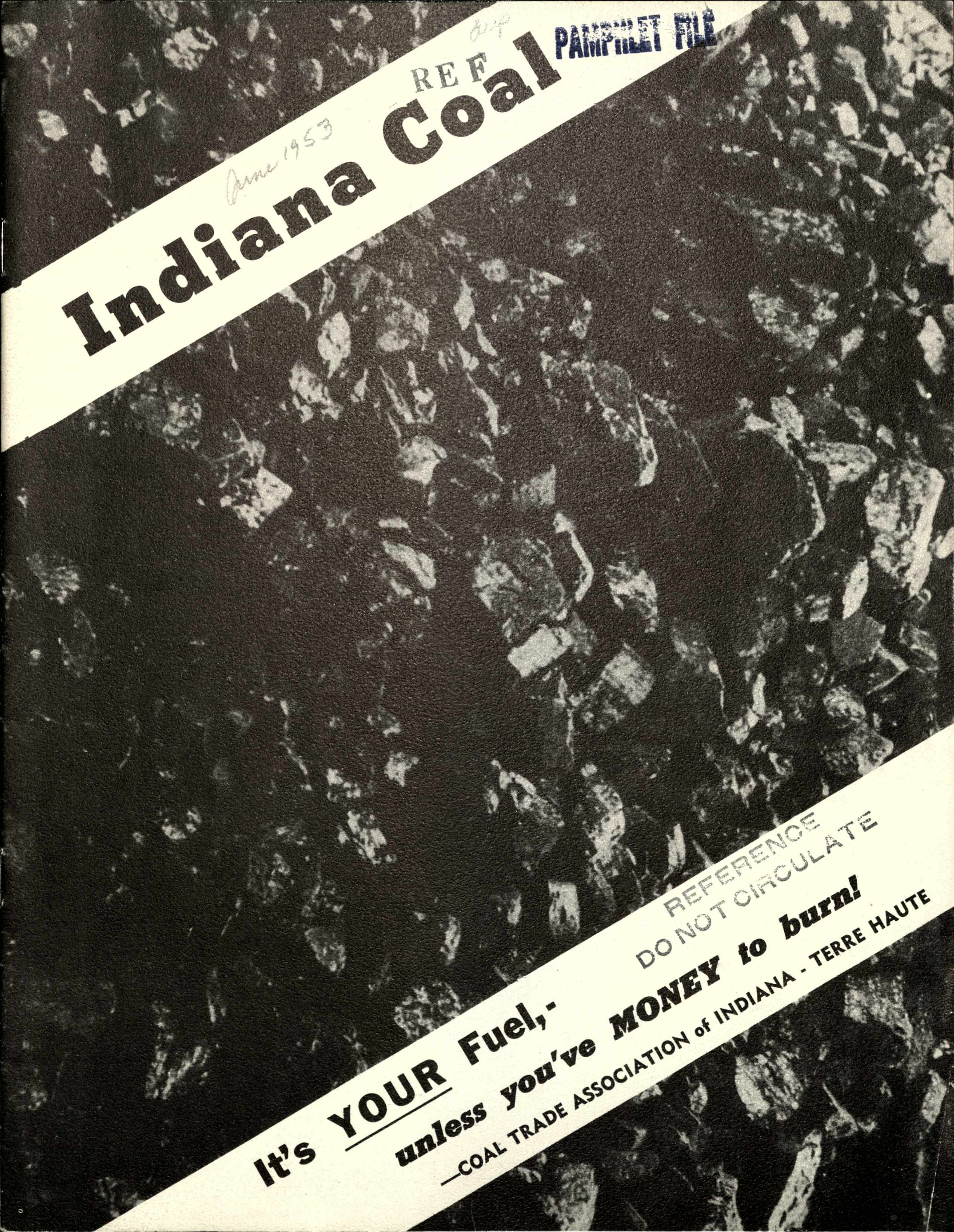
REF

PAMPHLET FILE

June 1953

# Indiana Coal



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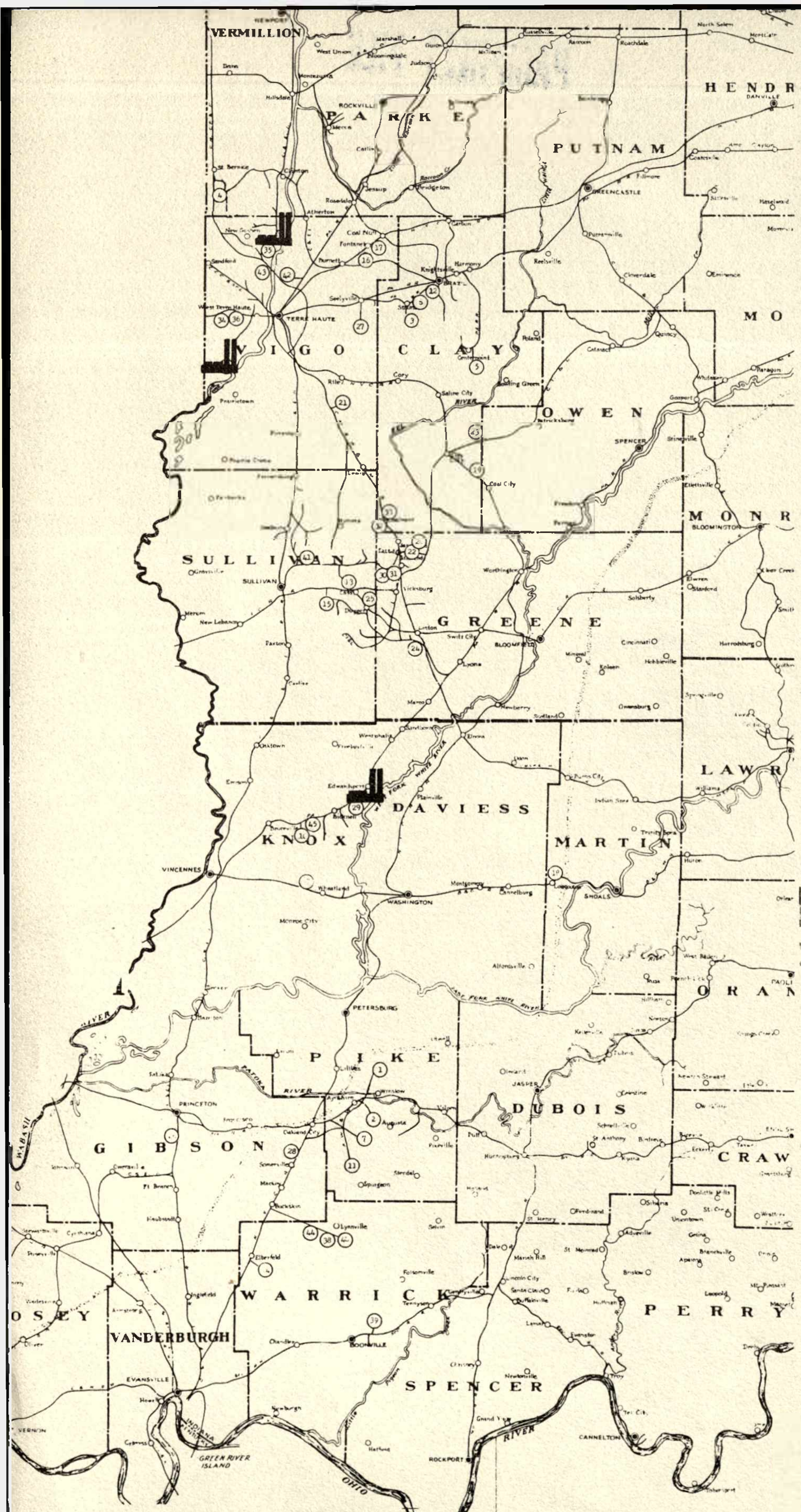
DO NOT CIRCULATE

**It's YOUR Fuel,-**
***unless you've MONEY to burn!***

—COAL TRADE ASSOCIATION of INDIANA - TERRE HAUTE



Legend:—Coal mines on rail lines, indicated by little numbered circles. Most circles indicate mines served by Public Service Company generating stations which are designated by small black silhouettes.

☆Other fuels may come and go, but Indiana coal goes on and on! Total reserve supply is estimated at 51 billion tons which, at the present rate of use, should last for about 2,000 years.

The coal producing companies of Indiana operate 44 rail mines and some 55 truck mines. Their total capital investment is approximately 100 million dollars. They employ, as of early 1953, about 9,000 miners in the production and processing of coal ready for shipment and use. Their annual employee payroll exceeds $33,000,000.

The miners, a hardy race endowed with skill and courage, produce about 11 tons of coal per man day using modern electric power equipment, and they work about two-thirds of the days of the year.

In the past 40 years they have produced an average of 19,00,000 tons per twelvemonth. But they have risen to the crisis of every war emergency,—in 1944, their production exceeded 28,000,000 tons.

Modern combustion methods, including automatic, controlled firing, have demonstrated increasingly the utility of Indiana coal. The demand for it, therefore, is expected to continue growing, year by year.

This little booklet was prepared for the Coal Trade Association of Indiana (Terre Haute) by Public Service Company of Indiana, Inc., which uses more than two million tons of coal per year to generate electric power for Hoosier homes and industries. . . . Approximately 109,000,000 kilowatt hours of this energy is consumed in the mining and preparation of coal.

**PUBLIC SERVICE COMPANY OF INDIANA, INC.**
Plainfield, Indiana, June, 1953.

## INDIANA
## Rail Mine Companies

Ayrshire Collieries Corp., Indianapolis, 4 mines

Big Bend Collieries, Chicago.

Birch Creek Coal Co., Chicago.

Blackfoot Coal & Land Corp., Evansville.

Walter Bledsoe Co., Terre Haute.

Central Indiana Coal Co., Indianapolis.

Enoco Collieries, Indianapolis.

Enos Coal Mining Co., Indianapolis.

Hickory Grove Coal Mining Corp., Terre Haute.

Ingle Coal Corp., Elberfeld.

Linton-Summit Coal Co., Terre Haute, Ind.

Lone Star Coal Co., Brazil, 2 mines.

Mariah Collieries Corp., Chicago.

Maumee Collieries Co., Terre Haute, 6 mines.

Pandora Coal Corp., Chicago.

Princeton Mining Co., Terre Haute

Saxton Coal Corp., Petersburg.

Shasta Coal Corp., Chicago.

Sherwood-Templeton Coal Co., Indianapolis, 2 mines.

H. A. Siepman Coal Co., Coalmont.

Snow Hill Coal Corp., Terre Haute. 3 Mines

Sunlight Coal Co., Chicago, 2 mines

Tecumseh Coal Corp., Chicago.

Templeton Coal Co., Terre Haute.

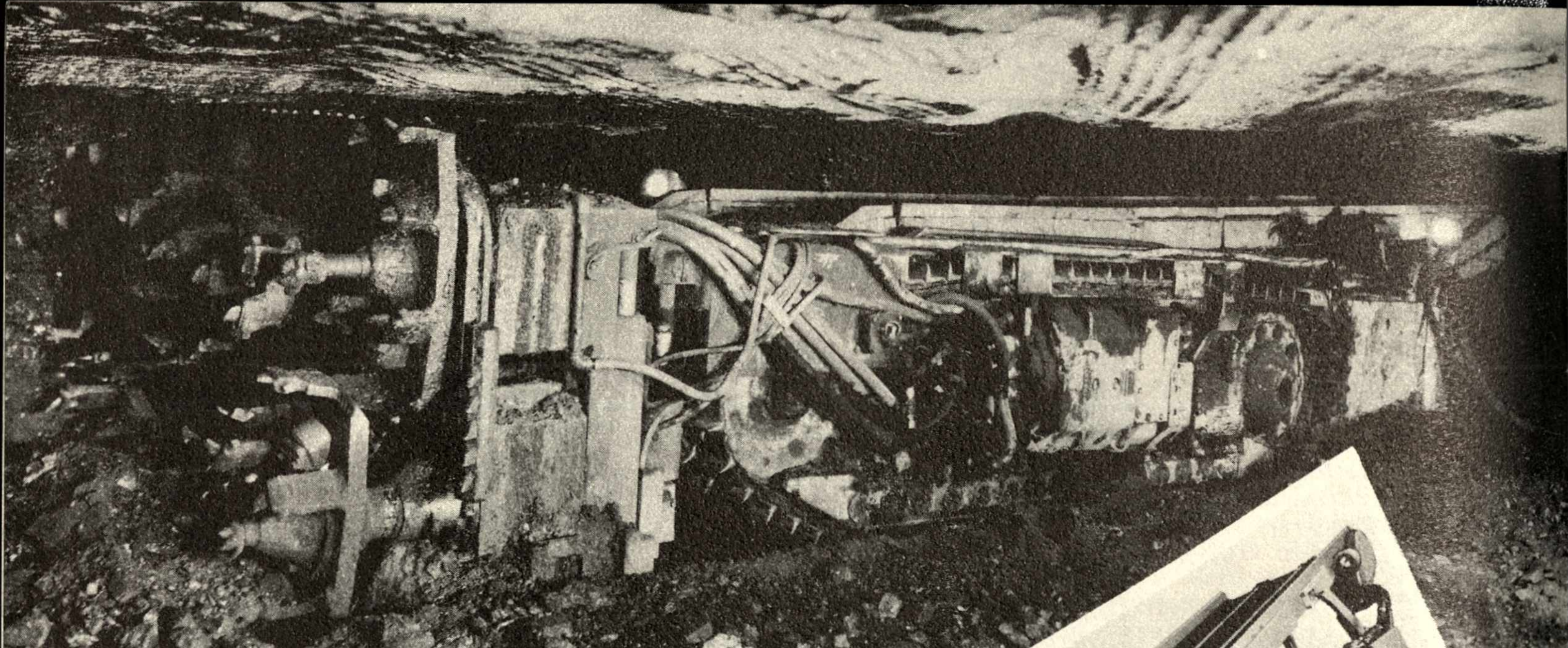
Tri-K Mining Co., Terre Haute.

Truax-Traer Coal Co., Chicago.

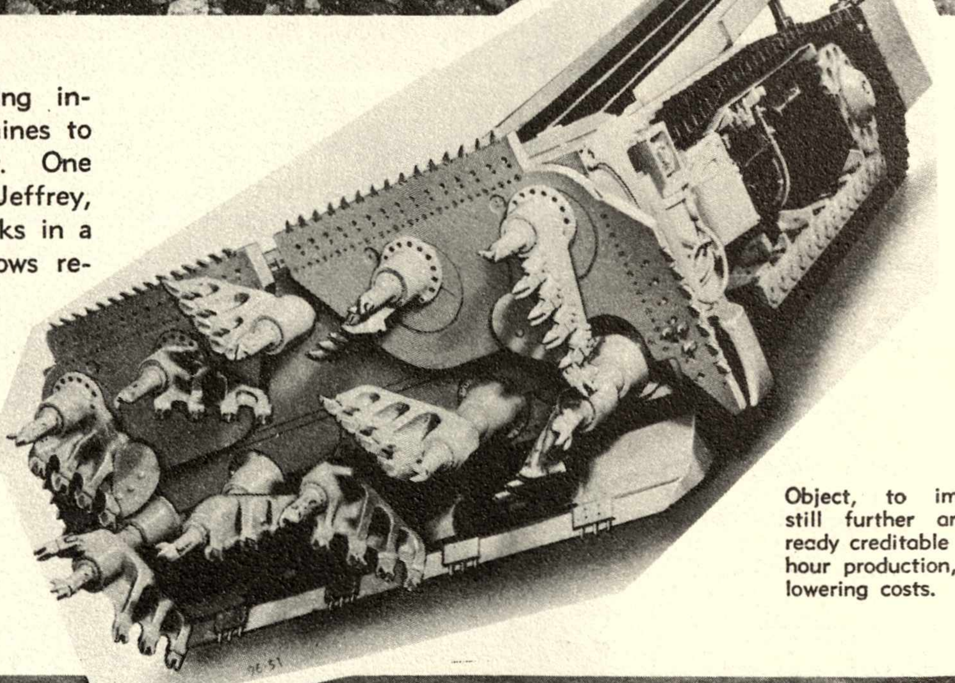
Viking Coal Corp., Terre Haute, 2 mines

Wasson Coal Mining Corp., Boonville.

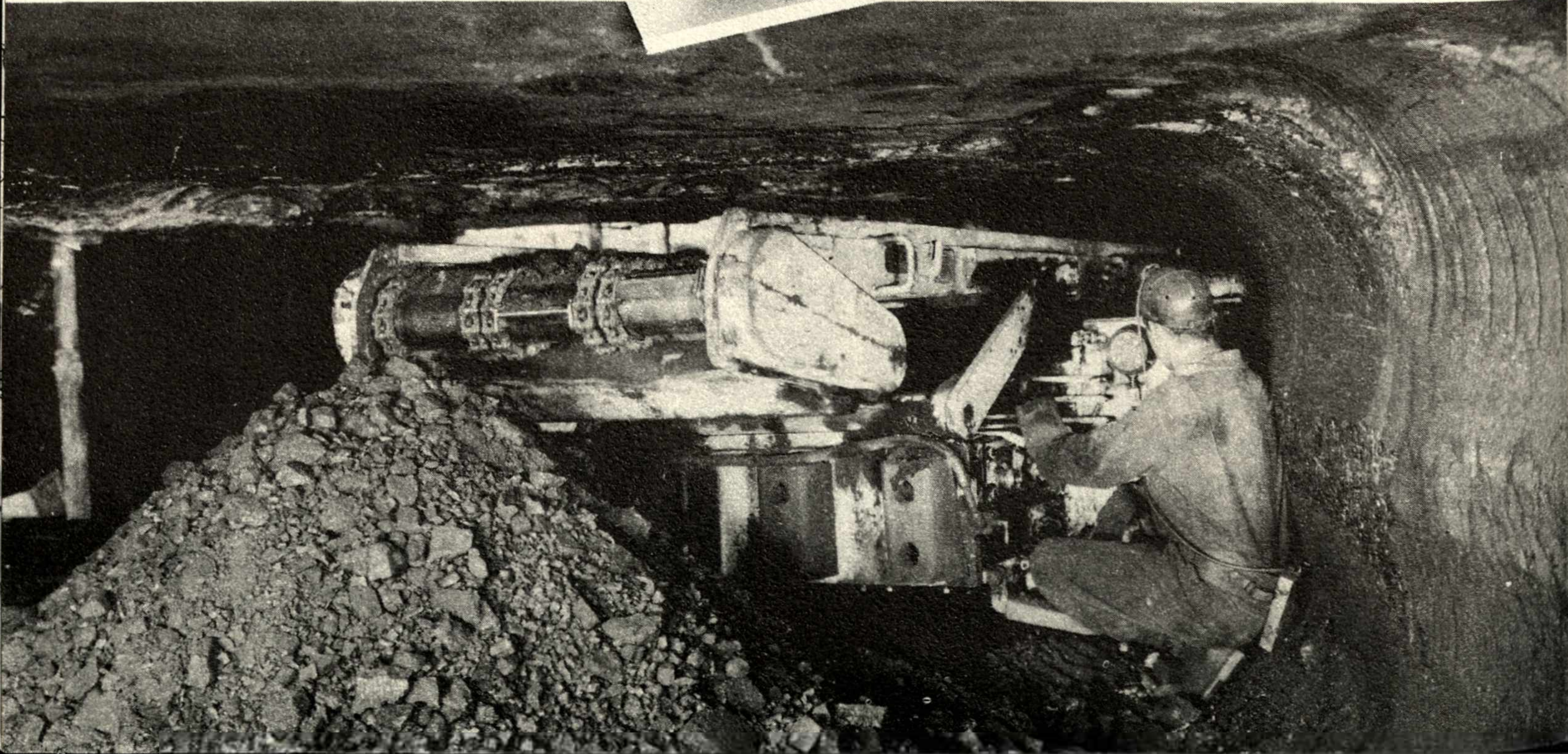
Wolfe & Koenig Corp., Bicknell.

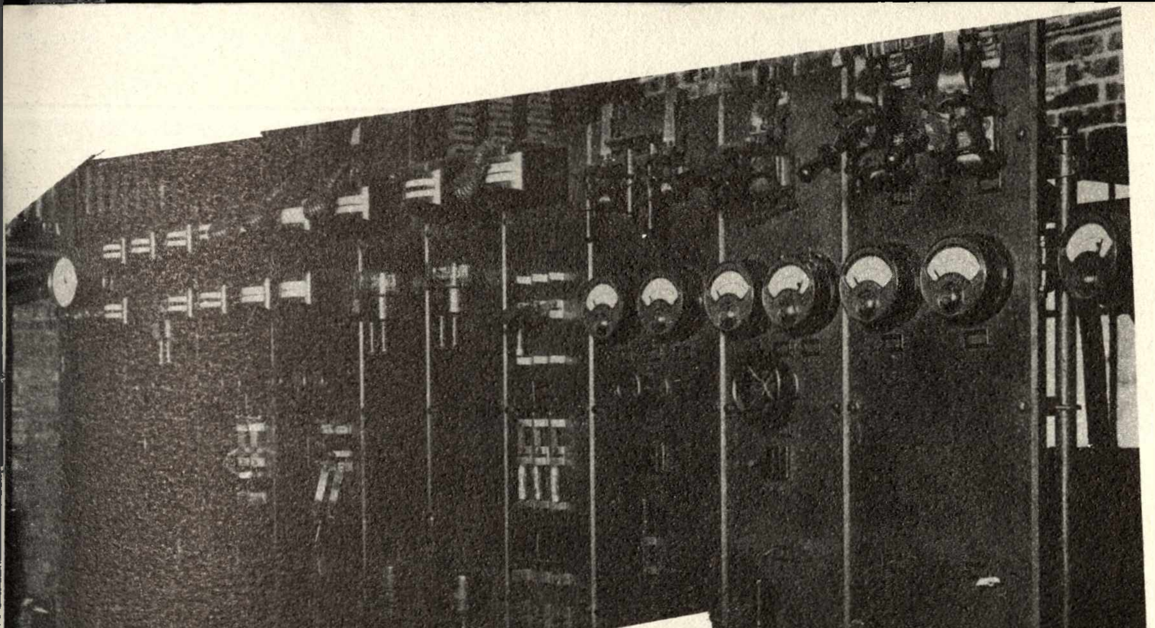


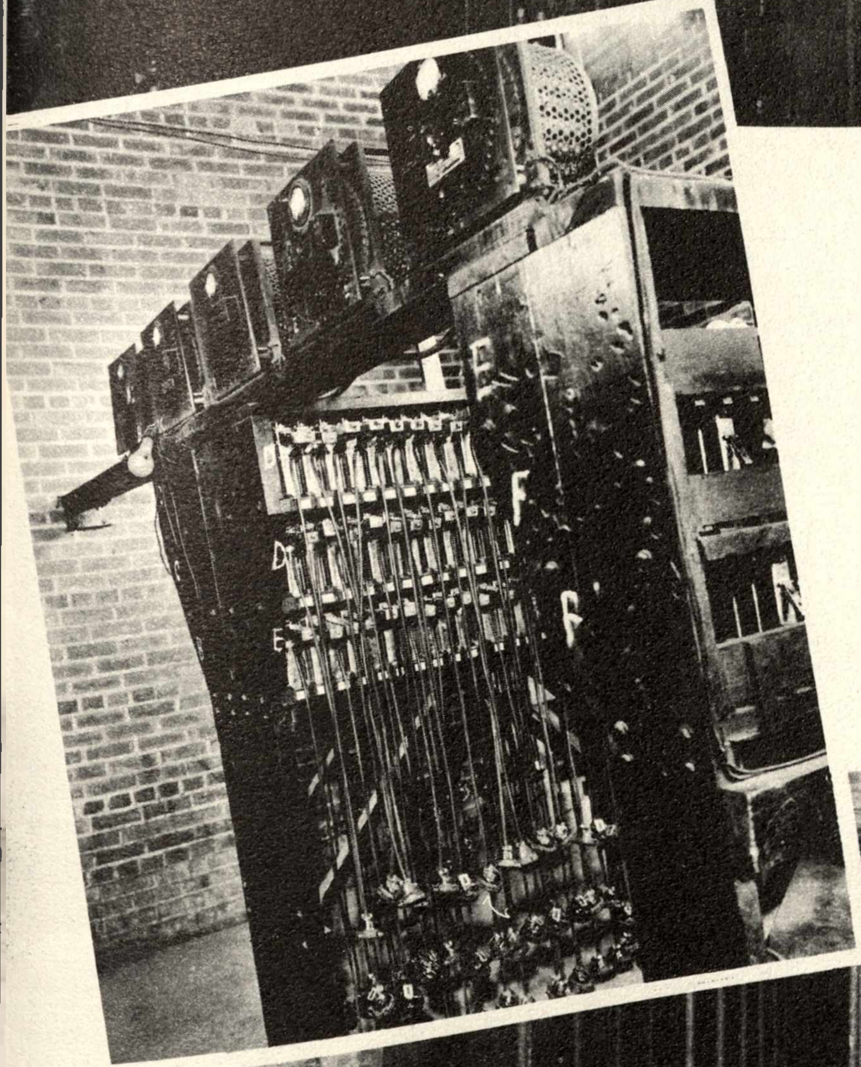
"Continuous Miner"—Manufacturing ingenuity has come up with new machines to mechanize mining almost completely. One of the new devices is the Colmol (Jeffrey, Columbus, O.), shown here as it works in a Knox County mine. Upper view shows revolving gougers tearing coal out of the wall; lower, discharging the coal at rear (to electric cars or belt conveyor) after passage through "innards" via screw-threads and belt.—Center, close-up of business end of Colmol, which a man would not wish to meet in a dark alley!



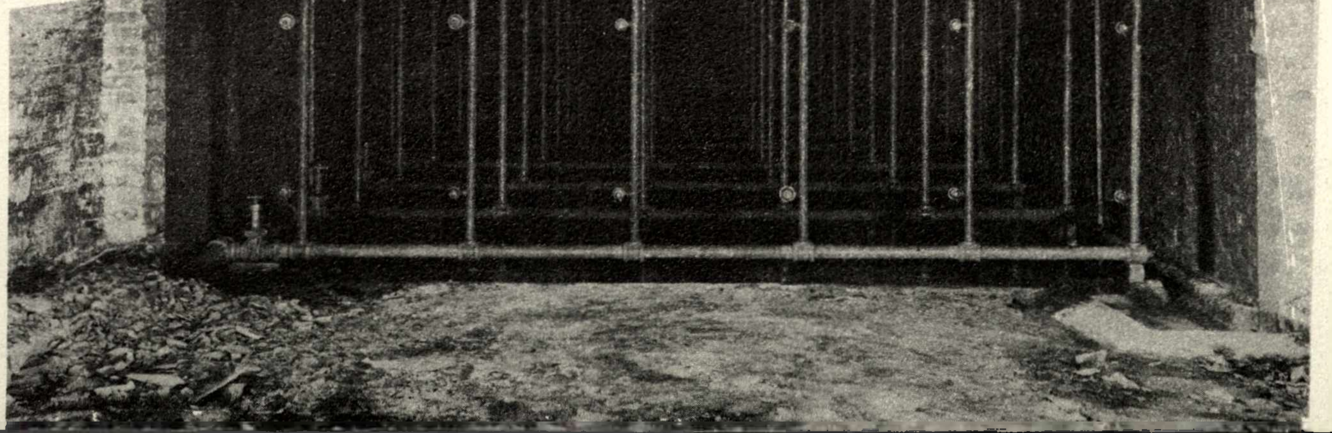
Object, to improve still further an already creditable man-hour production, thus lowering costs.







Your modern Indiana Coal miner is "power-full." This big switchboard powers and controls all his work. . . . At center-page is the charging panel, where the miners' safety-lamps are regularly re-charged. Each man carries a battery on one hip, so that his light may shine in dark nooks and crannies into which a lighting system may not reach. . . . Air-conditioning of shaft mines has been found not merely a safety and comfort factor for the men, but an efficiency factor as well. This Bureau of Mines photo (below) shows a washed air intake; air is circulated throughout the mine by huge electric fans.



**INDIANA COAL** — Veins or seams near the surface are taken by "strip" or "open-cut" methods. Giant shoveling machines scoop the soil away and then the coal is removed from the pit by another machine. . . . The huge "bucket" scoops yards and yards of dirt at a bite . . . This mine's dipper, about as tall as a 6-story building, is playfully showing off its strength.

The men who name Pullman cars and racehorses have a competitor,—the man who names coal mines! Look through the alphabetical list of Indiana rail mines:

Alum Cave, Ayrdale, Ayrshire (2), Big Bend, Blackfoot, Buckskin, Chieftain, Chinook and Commodore;

Ditney Hill, Enoco, Enos, Friar Tuck, Green Valley, Hickory, Jonay and Julian;

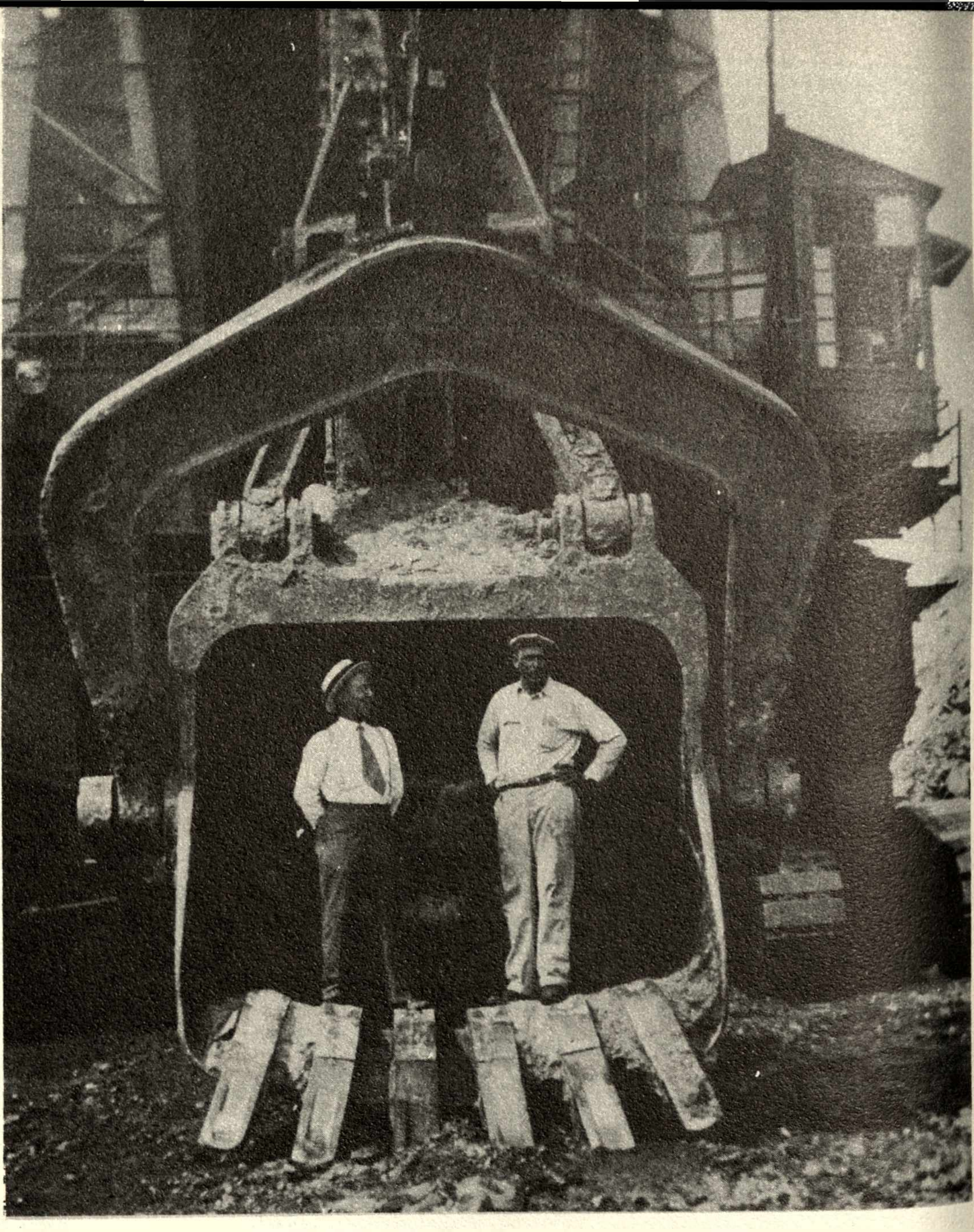
King Station, Linton, Lone Star and Loogootee;

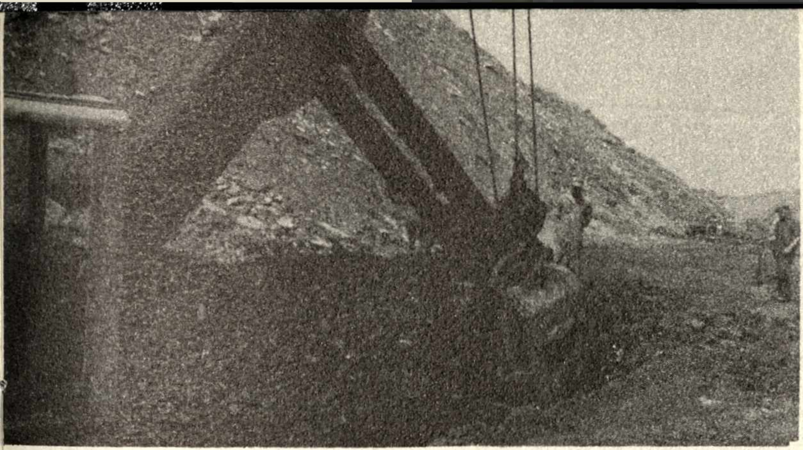
Maid Marian, Minnehaha, Oak Leaf and Old Glory;

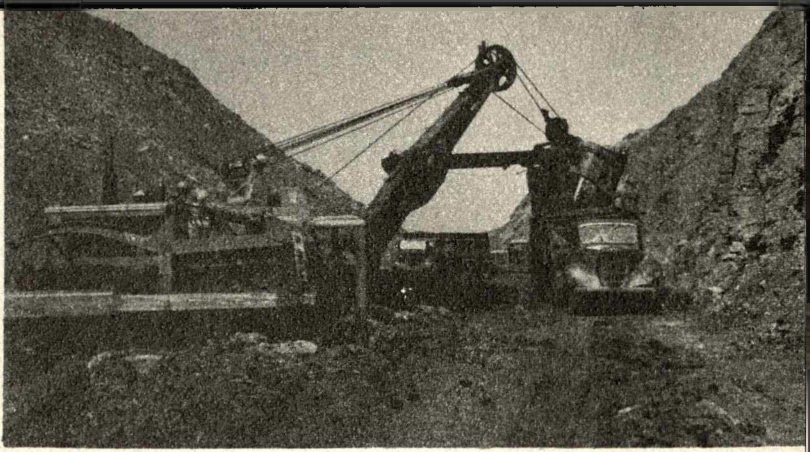
Pandora, Panhandle, Regent, Robin Hood and Royal Splint;

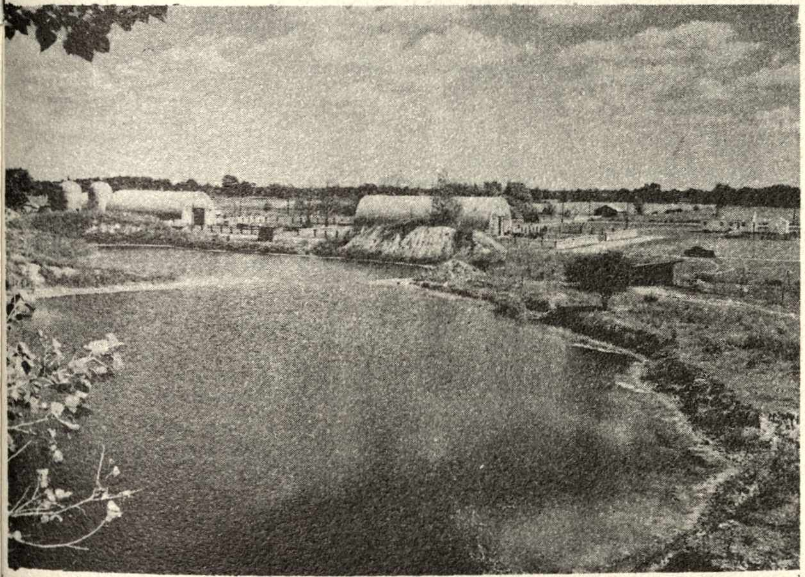
Saxton (2), Shasta, Sullivan, Sunlight (2), and Sunspot;

Talleydale, Tecumseh, Turner, Victory, Viking and Wabash.

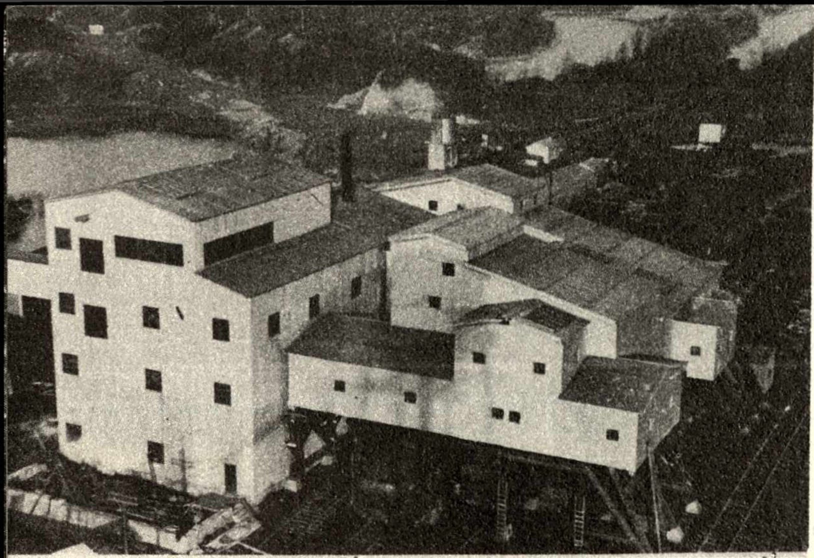


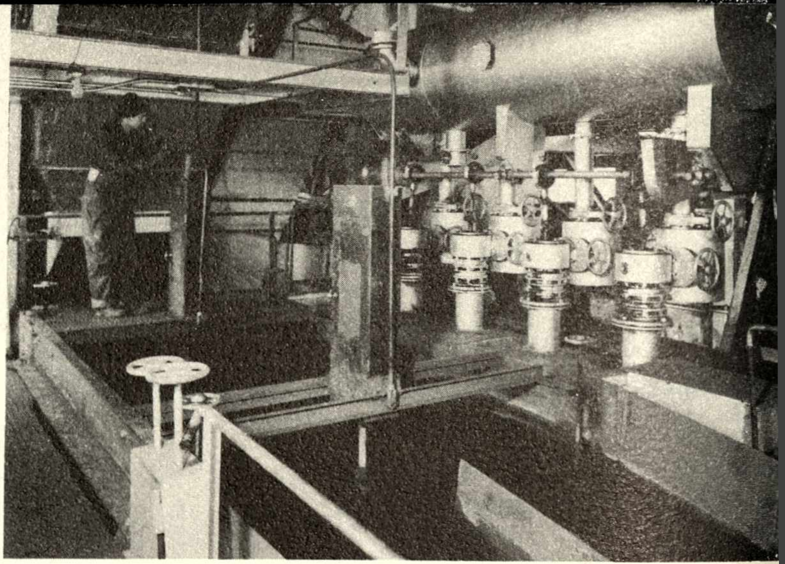




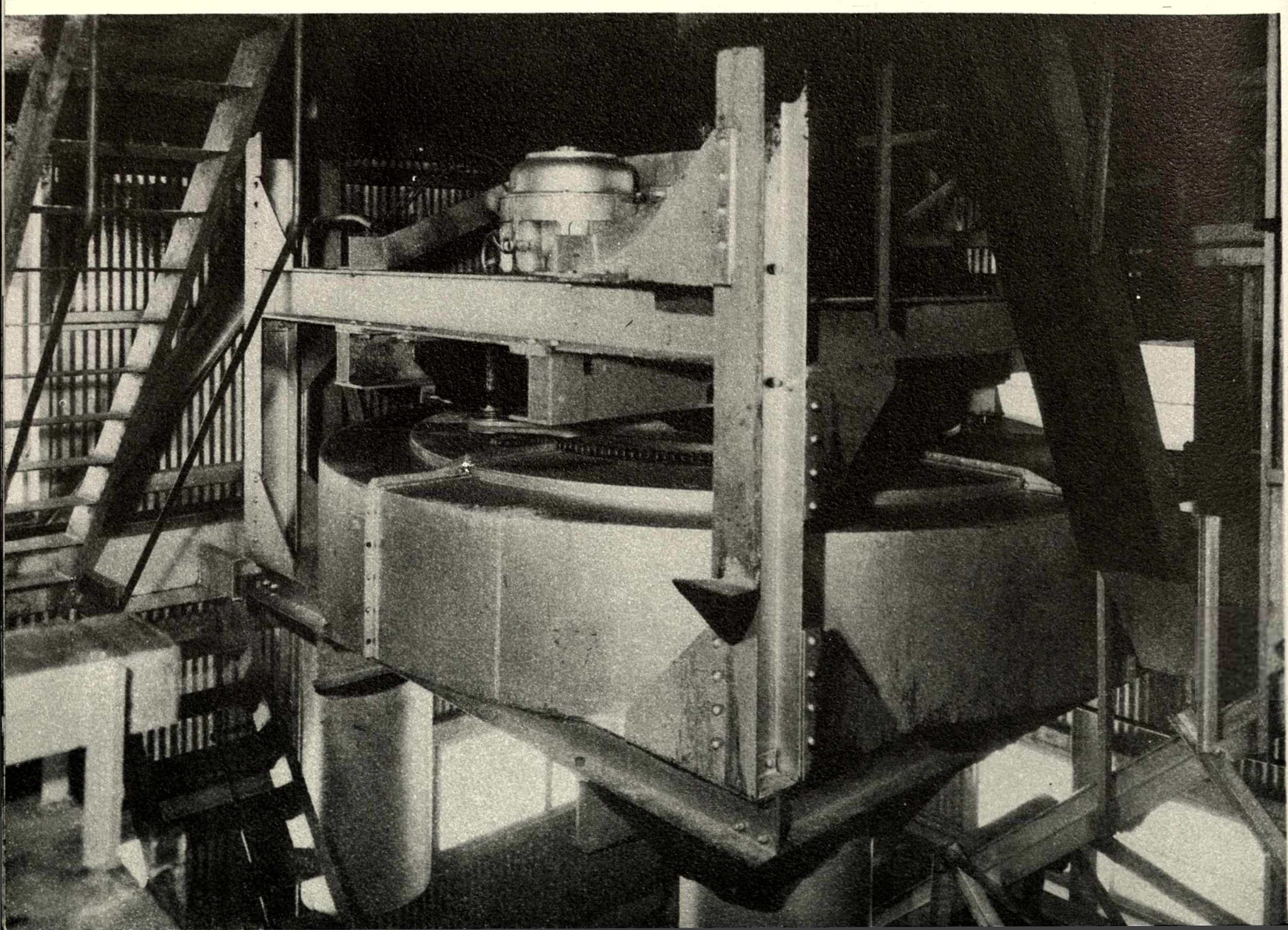


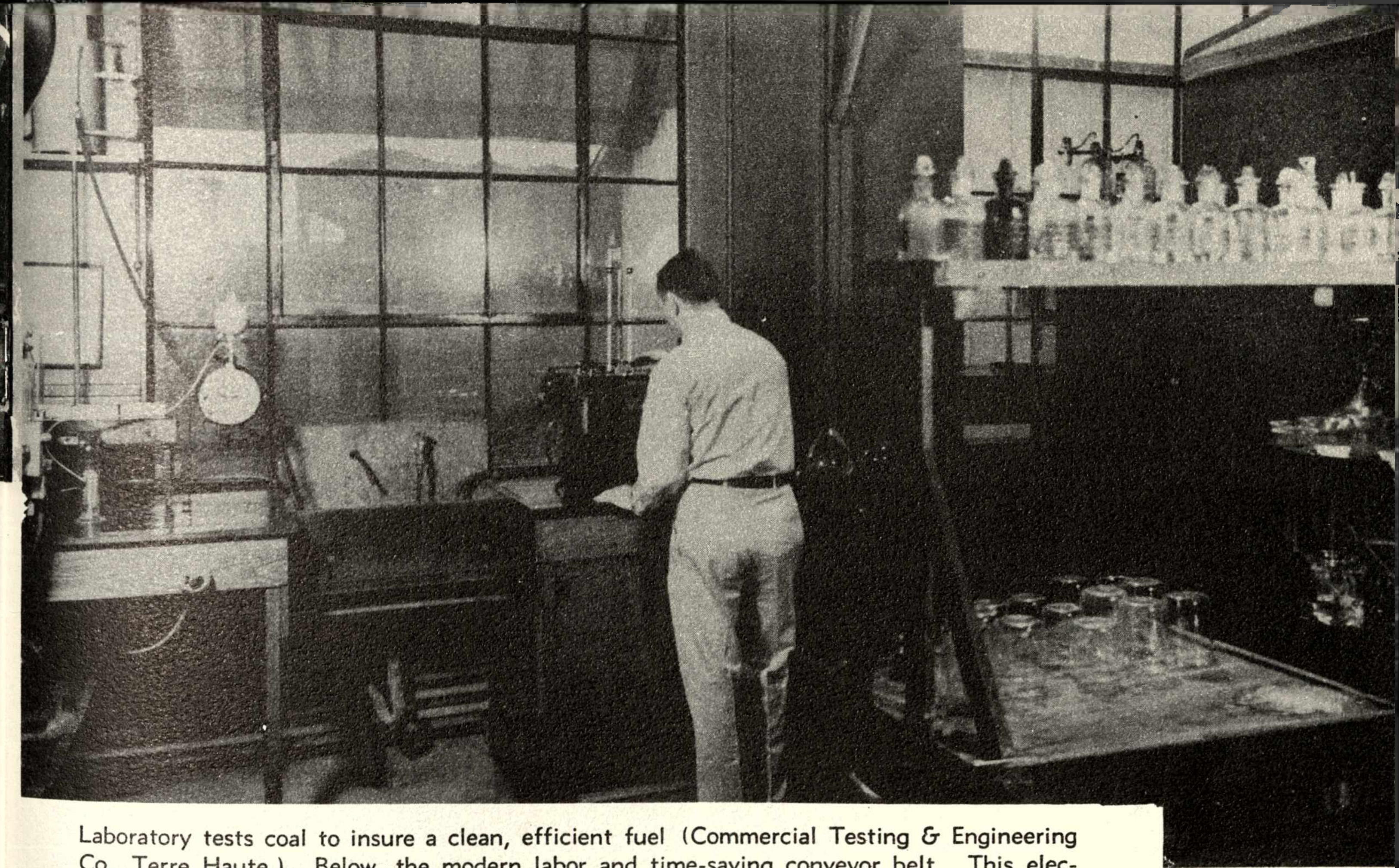
Taking up and loading coal (above) after the overburden has been removed. Open-cut mining permits nearly 100% recovery of coal. Then comes reforestation (over 30 million trees in Indiana, to date) with small lakes and good fishing, for trimmings! Lovely scene below was once a coal operation; and so was Ayrshire's handsome farm, at left in Vermillion county.



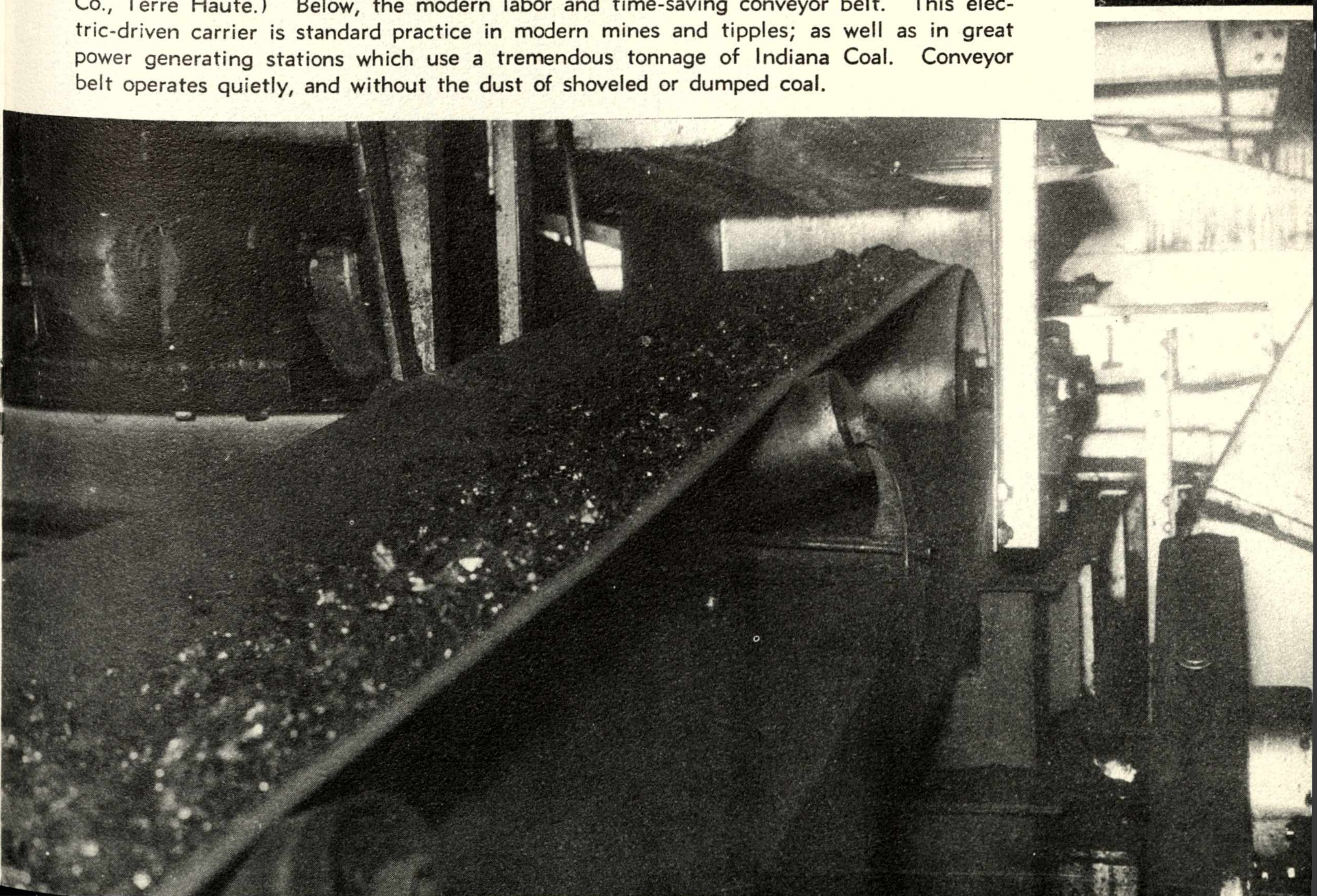


THE TIPPLE is a processing or preparation plant where coal (both shaft and strip mine) is screened, washed and dried before loading for shipment. Indiana leads the nation in percentage of coals prepared in modern processing plants. This one, like many others, is painted white . . . Coal laundry, high up in the tipple, looks about as clean as any laundry should. Running water in pool carries off dirt and impurities . . . After washing, the coal is put through a drier—this one (bottom of page) being of the drum or centrifugal type.





Laboratory tests coal to insure a clean, efficient fuel (Commercial Testing & Engineering Co., Terre Haute.) Below, the modern labor and time-saving conveyor belt. This electric-driven carrier is standard practice in modern mines and tipples; as well as in great power generating stations which use a tremendous tonnage of Indiana Coal. Conveyor belt operates quietly, and without the dust of shoveled or dumped coal.



PICTURE OF A MAN, without a shovel, loading several coal cars at one time. With his right hand on the electric button he releases a car, below left, to move a few feet, and with his left hand he works the grips which control the chutes which empty the coal into the cars

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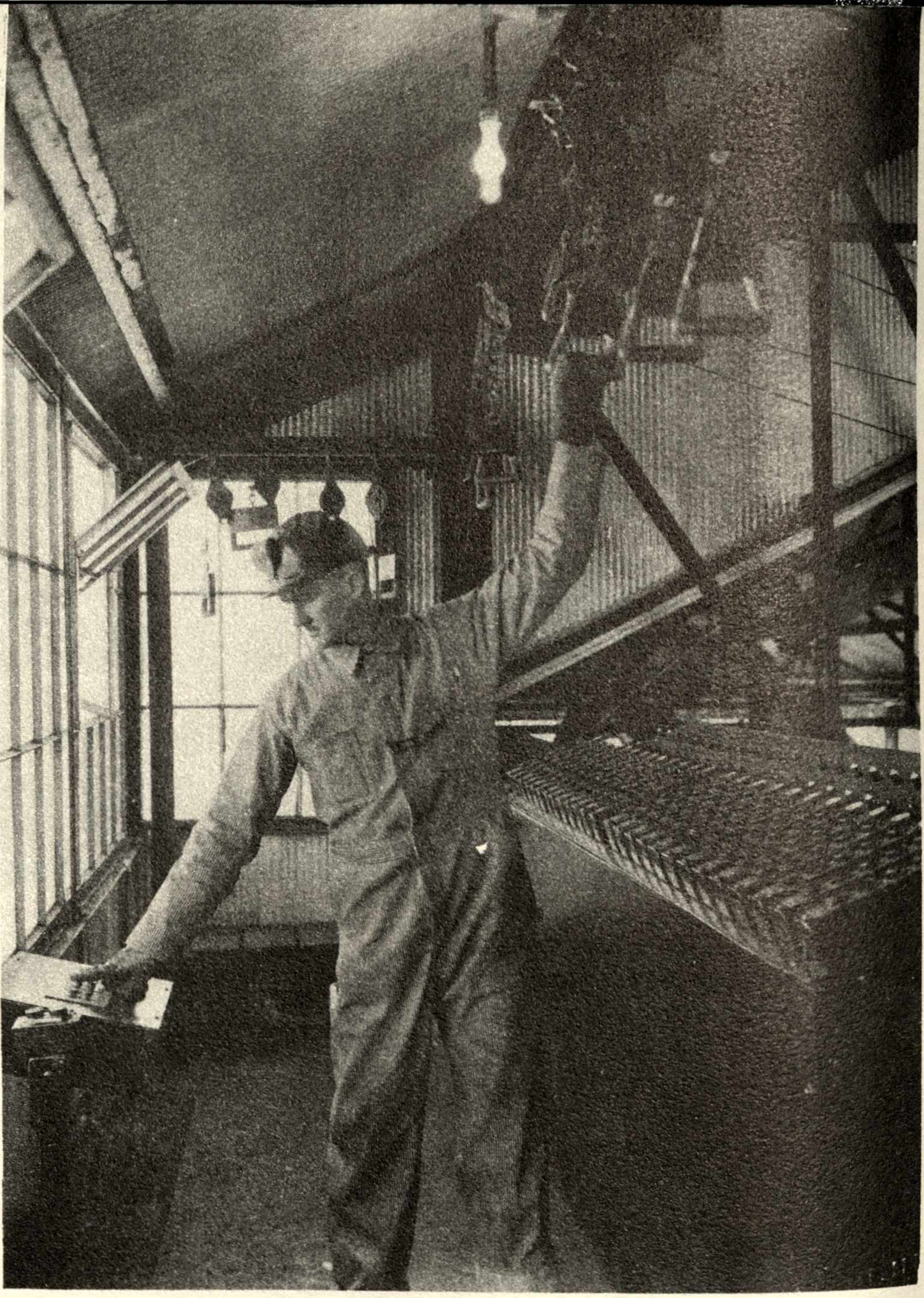
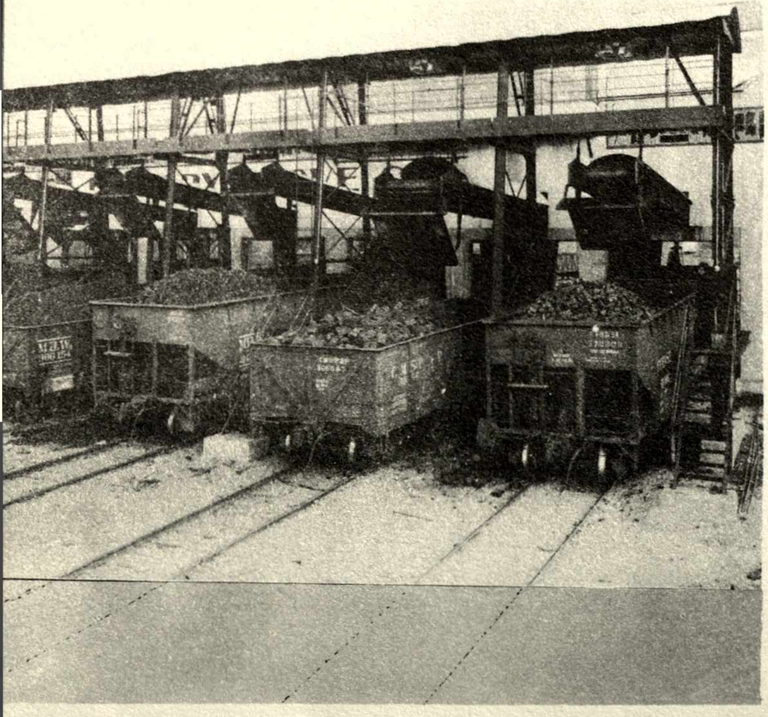
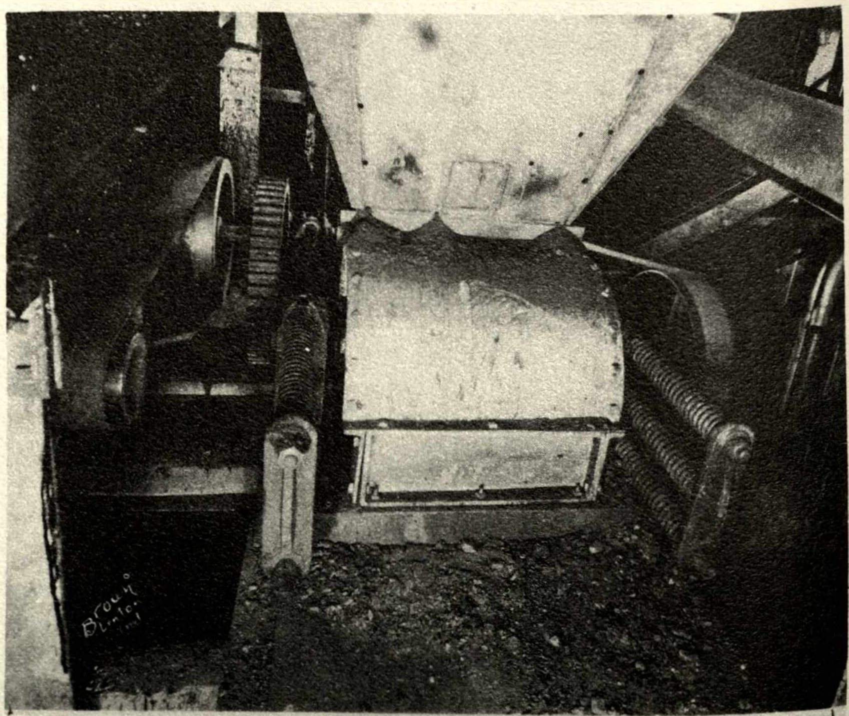
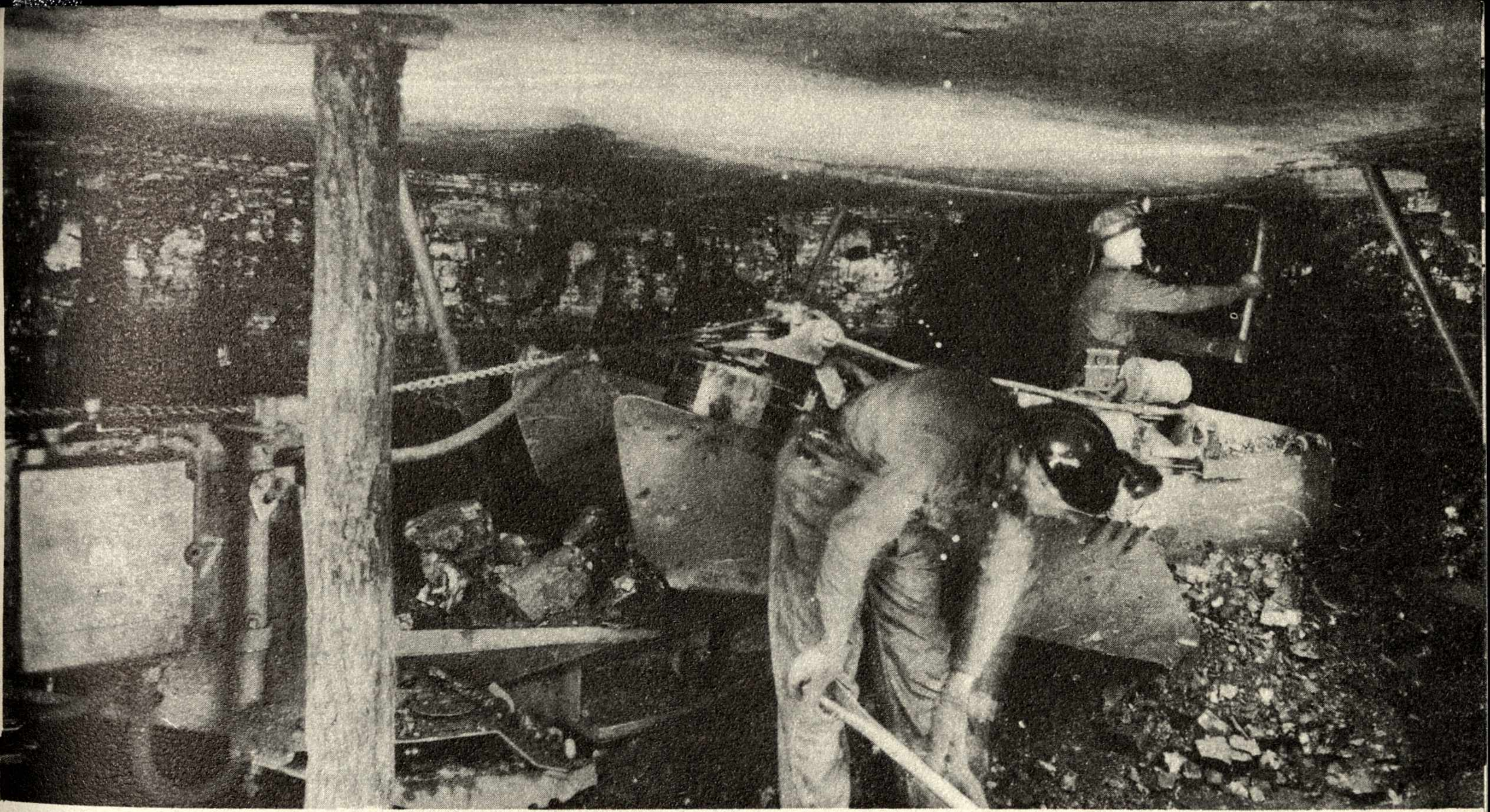
. . . Below right, giant crusher which prepares coal for utilities and industries using a crushed coal.



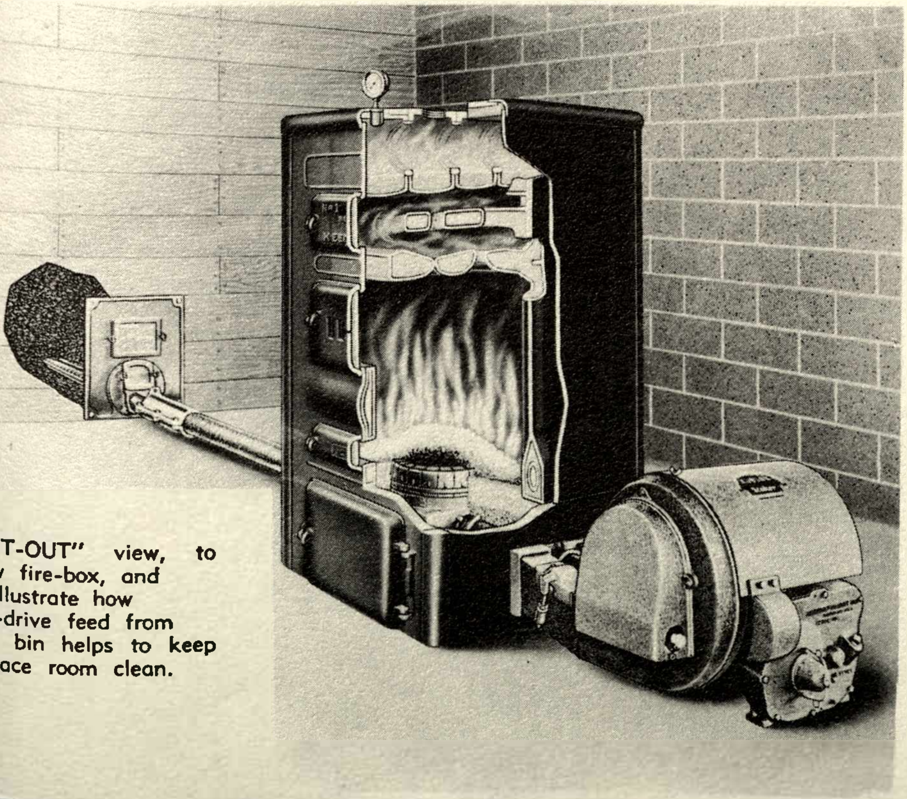






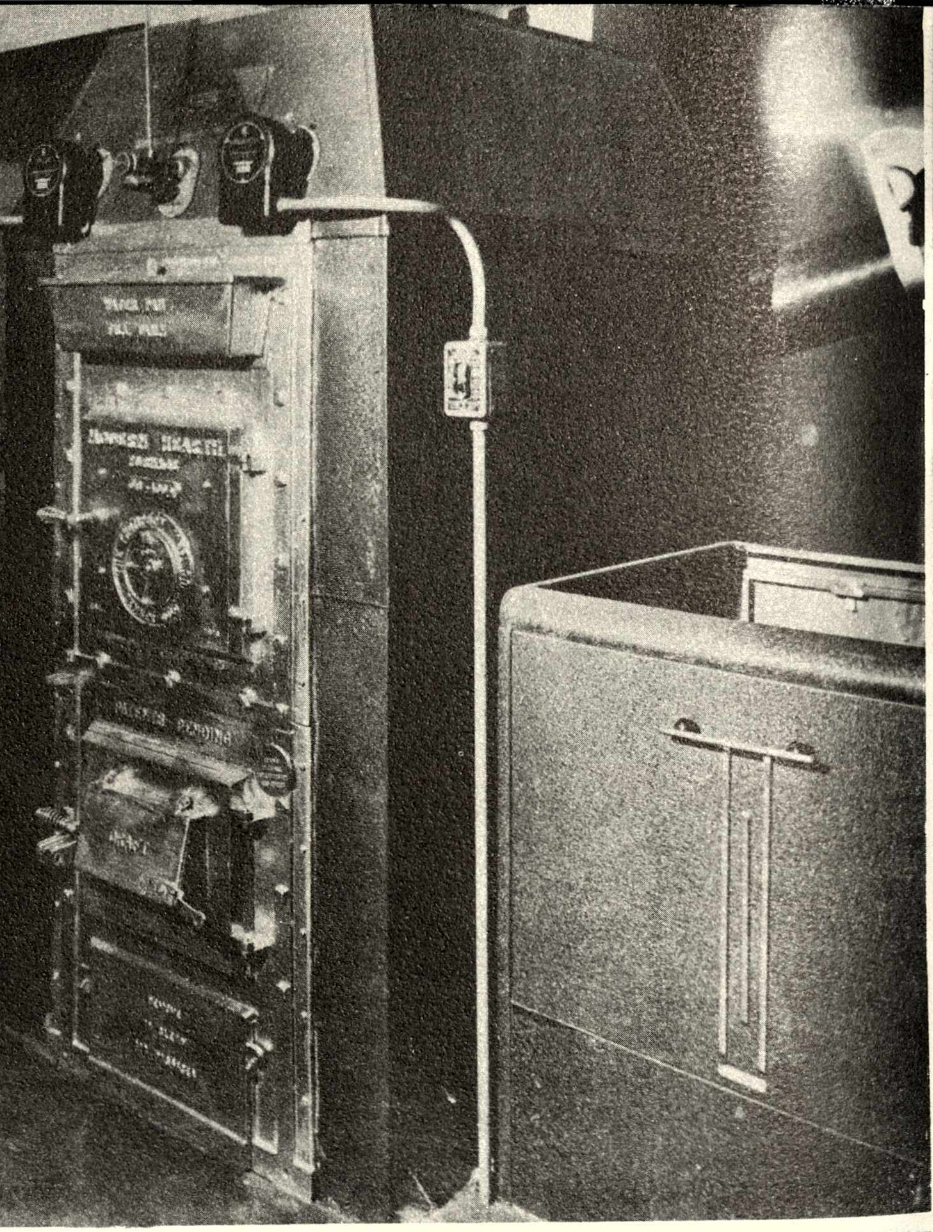
Indiana coal averages about 12,000 Btu's (heat value) per pound. From that, Public Service modern generating stations produce a kilowatt hour of electric energy. Forty years ago, 4 pounds were used for 1 kwh. This four-fold improvement is due to better processing of coal, greater knowledge of combustion methods, and finer technique in building and operating boilers, generators and turbines. Improvement will proceed, for engineers know they are getting only about a third of the coal's heat value.

Hydro-electric power? A ton of water falling one-third of a mile can be harnessed to produce the same energy,—one kwh,—that is developed from one pound of coal. There, in a nutshell, is the reason Indiana's fine industrial progress is based on power generated with coal efficiently used,—we have plenty of coal; we do NOT have many tons of water at points where it can drop a third of a mile!

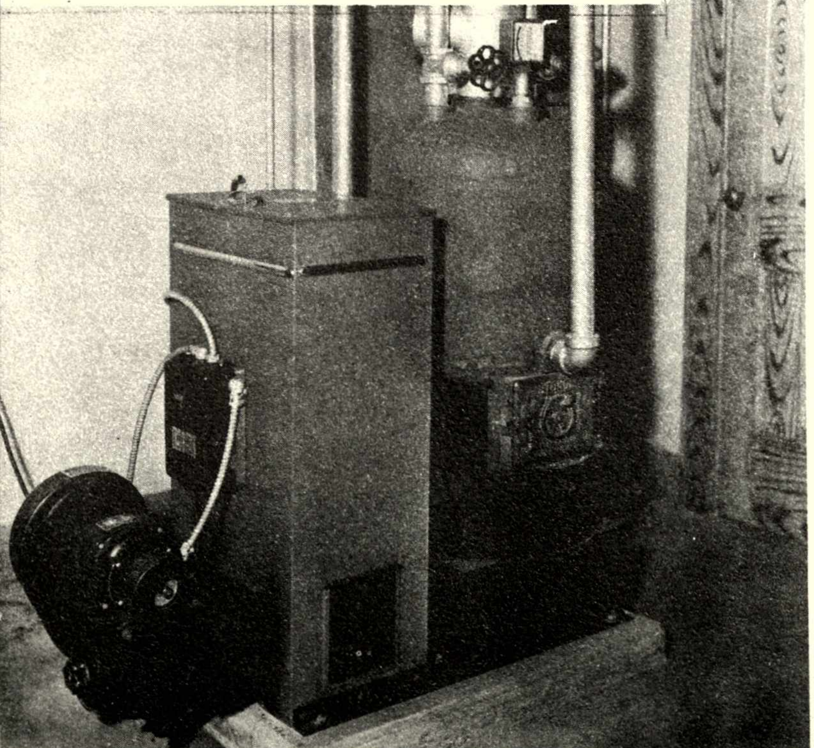


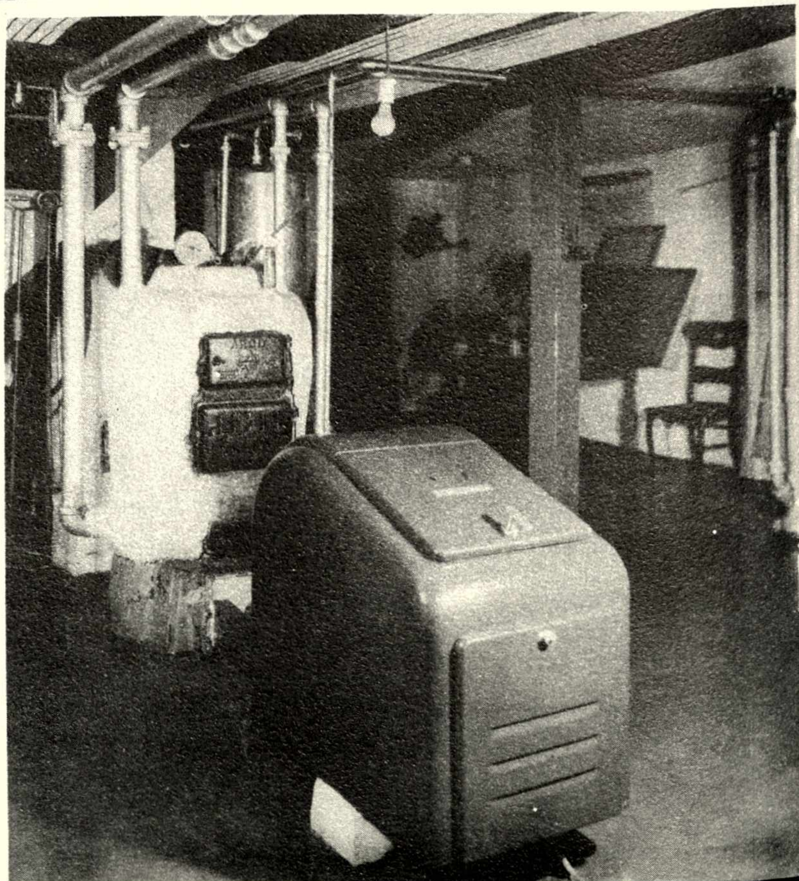
"CUT-OUT" view, to show fire-box, and to illustrate how line-drive feed from coal bin helps to keep furnace room clean.

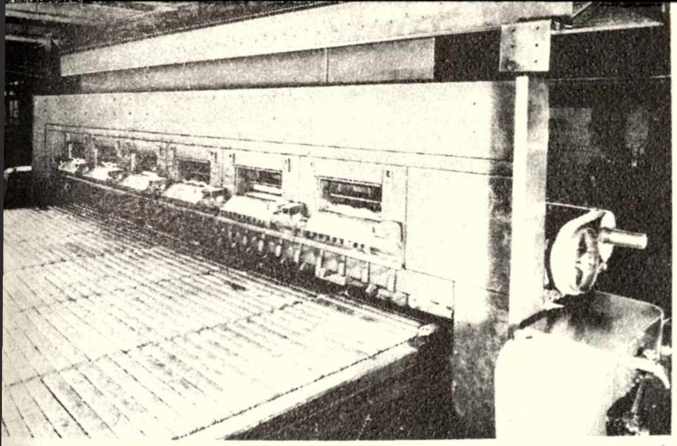
Nuclear fission? Government is investing billions of dollars in experiments, and MAY come out with a new competitor for coal as a source of electrical energy. At present, three things are definitely established,—1, a huge, expensive plant is required to produce atomic heat; 2, we do not have much uranium; and 3, we have an almost unlimited supply of coal! In Indiana, as elsewhere, coal should continue as our most feasible power source for years to come.



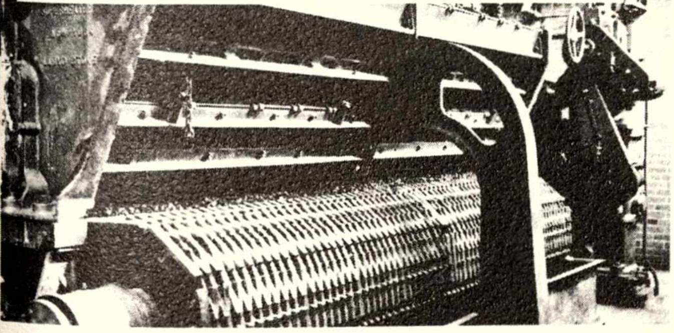
CLEANLINESS is not next to impossible, as the little boy said. Rather, it is next to efficiency . . . With automatic mechanical firing, cleanliness is easy and efficient. It is thrifty, too, because the soot and smoke attendant upon careless or inexpert hand-firing yield up extra heat units to the stoker before they are burned . . . Herewith, stoker units manufactured by Indiana users of Public Service power. Note neatness of these domestic installations.

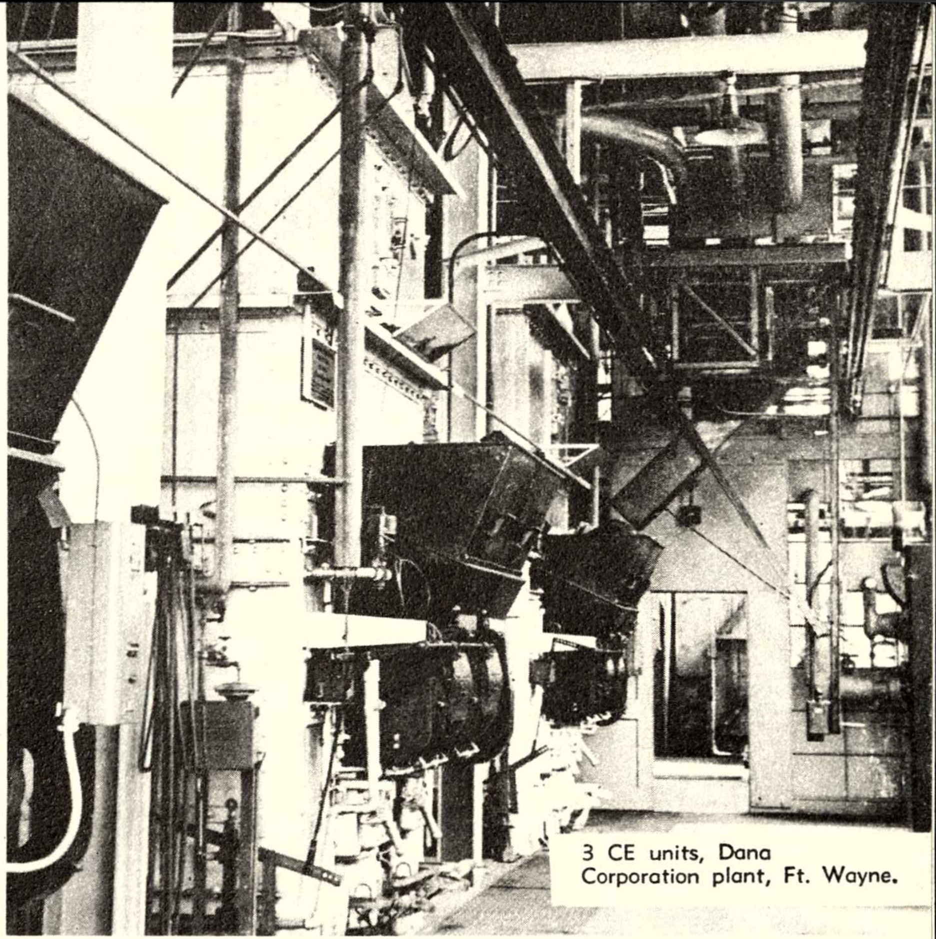




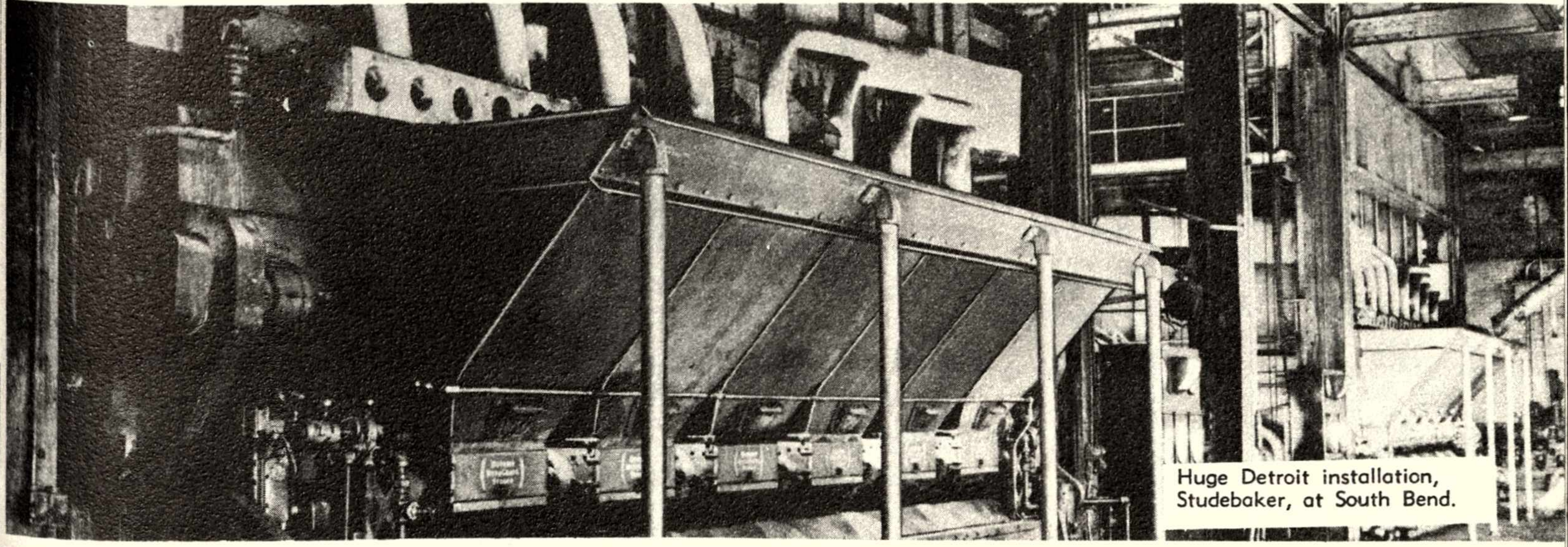


**Industrial installations**—Detroit Stokers feature the "RotoGrate", above, which empties ash at the front; as at Studebaker, center page . . . Combustion Engineering uses a traveling grate, as at Mead-Johnson plant, Evansville, below.

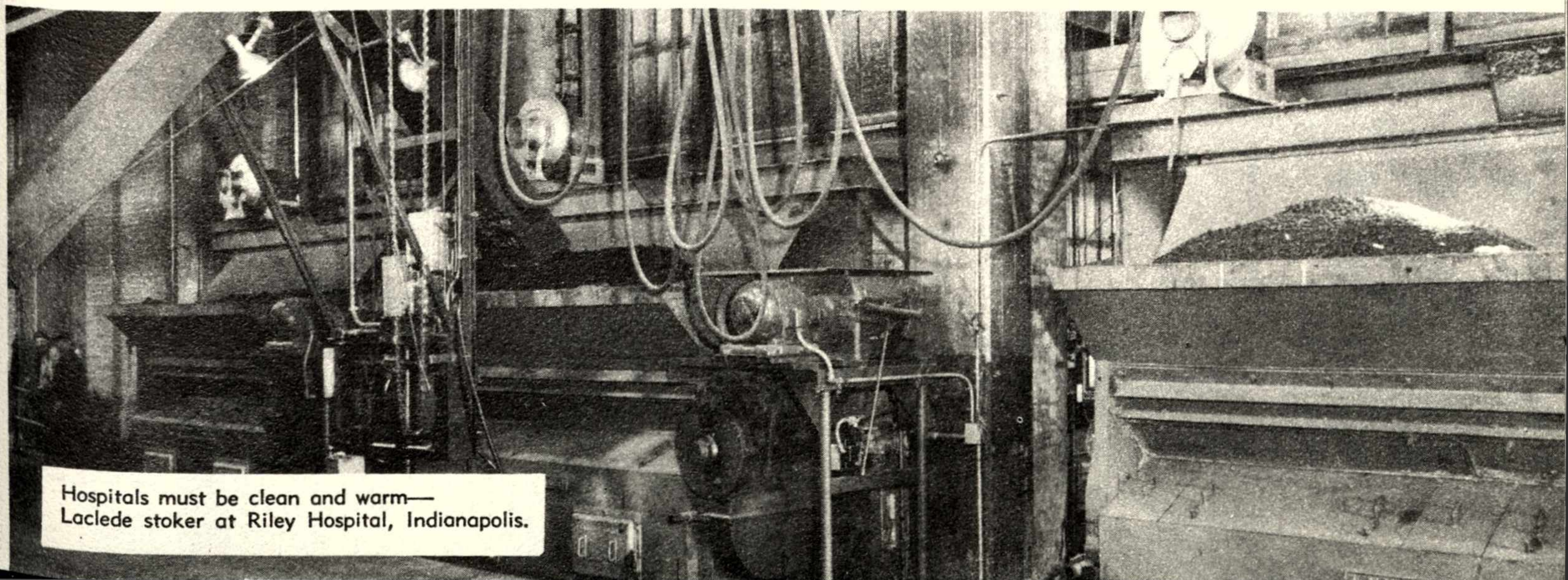




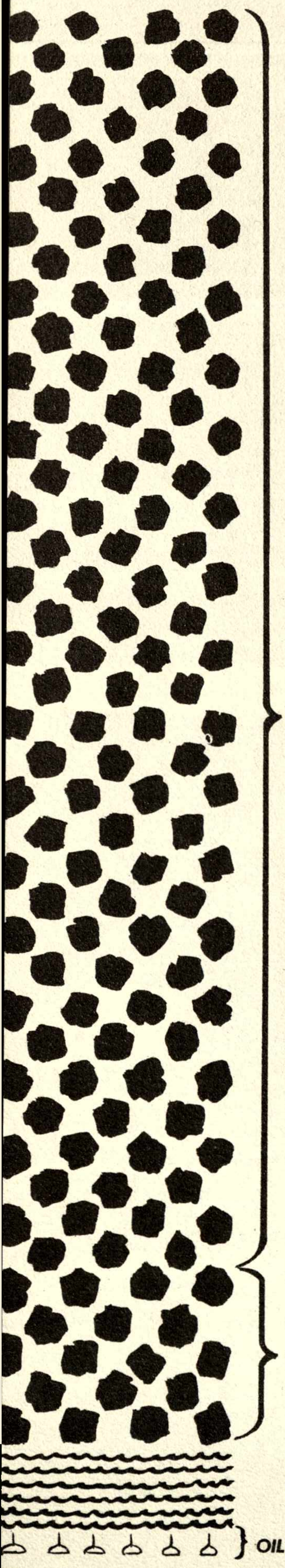
3 CE units, Dana Corporation plant, Ft. Wayne.



Huge Detroit installation, Studebaker, at South Bend.



Hospitals must be clean and warm—
Laclede stoker at Riley Hospital, Indianapolis.



# 97.5%

**of the electric power for Indiana's industry and commerce, farms and homes is generated with coal and steam**

•

## MOST OF THE COAL USED IS INDIANA COAL!

*COMPANY COAL GENERATING PLANTS* **88.5%**

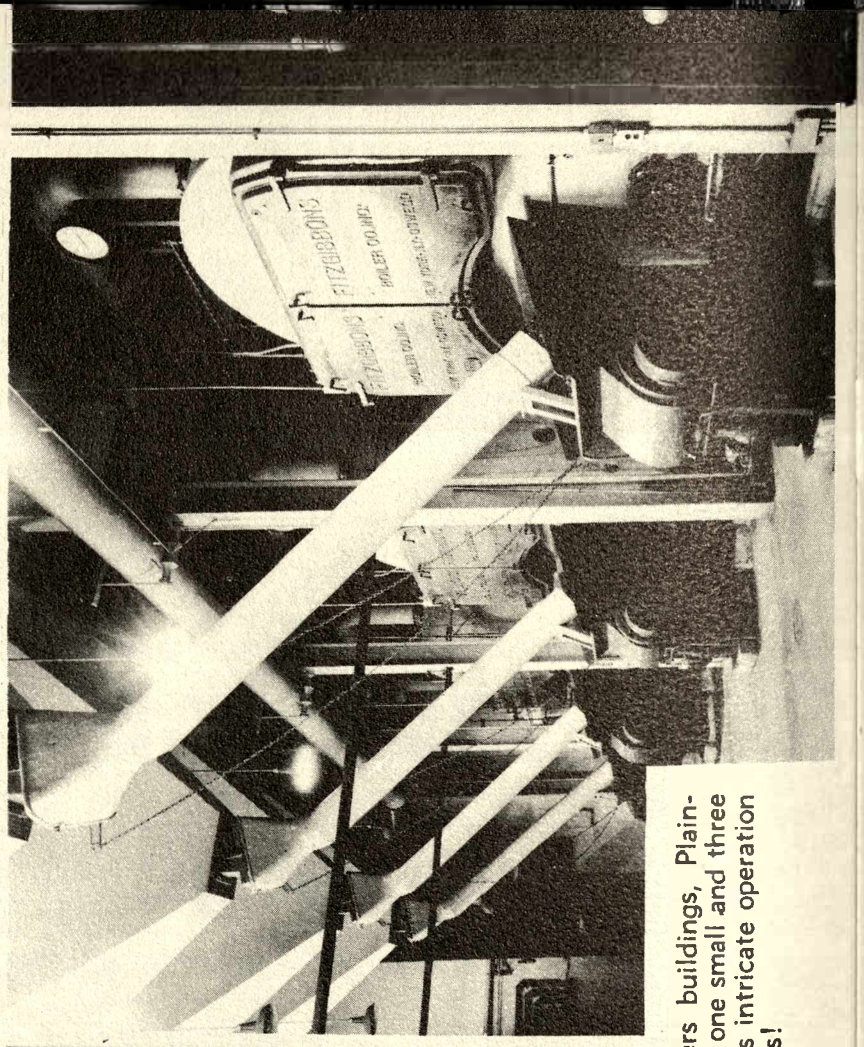
**Indiana's power is derived**

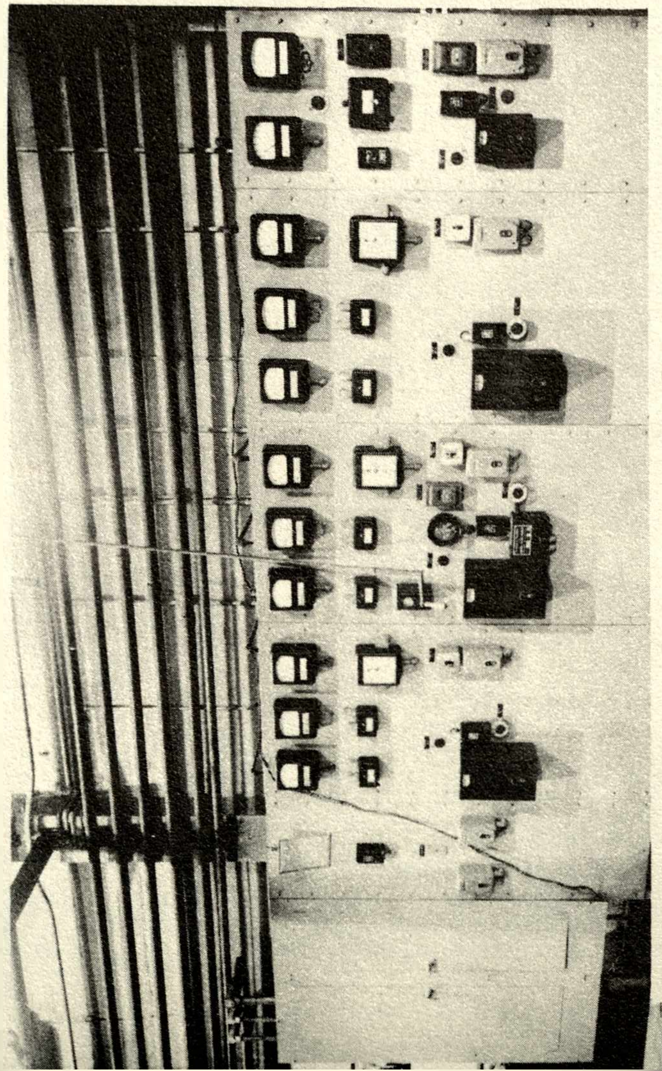
| | |
|---|---|
| from coal | 97.5% |
| hydro | 2.0% |
| oil | 0.5% |
| | 100% |

*MUNICIPAL COAL GENERATING PLANTS* **9%**

*HYDRO-ELECTRIC PLANTS OWNED BY COMPANIES 2%*

*OIL ENGINES IN MUNICIPAL PLANTS* **0.5%**





Cleanliness, fully automatic—Public Service Company general headquarters buildings, Plainfield, are heated by a modern, fully automatic stoker system which includes one small and three large burners. Using, of course, Indiana coal! Control panel, at left, makes intricate operation seem simple . . . Office personnel feels safe, wearing white shirts or waists!

# PUBLIC SERVICE COMPANY
# OF INDIANA
# OPERATES WITH INDIANA COAL!

Company use of Indiana coal has increased 61.2% in eight years . . Output of power has risen 115.1% . . Efficiency has improved 33.5%,—as charts below indicate.

One of the bigger users of electric power is the modern Hoosier miner. He (in the 50-odd mines served by PSCI lines) used 109,850,000 kwh in 1952, processing **Indiana Coal.**

**1944**
1 ton=1,242 kwh

Coal use

1,234,000 tons of Indiana coal used in PSCI generating stations

1944

Power Output

1,582,770,431 kwh of electric power were generated in PSCI stations for the use of 237,600 customers

1944

**1952**
1 ton=1,658 kwh

Coal use

1,989,258 tons of Indiana coal used in PSCI generating stations,—an increase of 61.2% in eight years!

1952

Power Output

3,297,356,000 kwh of electric power were generated in PSCI stations for the use of some 330,000 PSCI customers.

. . . Increase in production, and their use, 115.1%!

1952

**NOTE**

Increased efficiency was a **MUST!**

Company's total coal **cost** went up 231%!

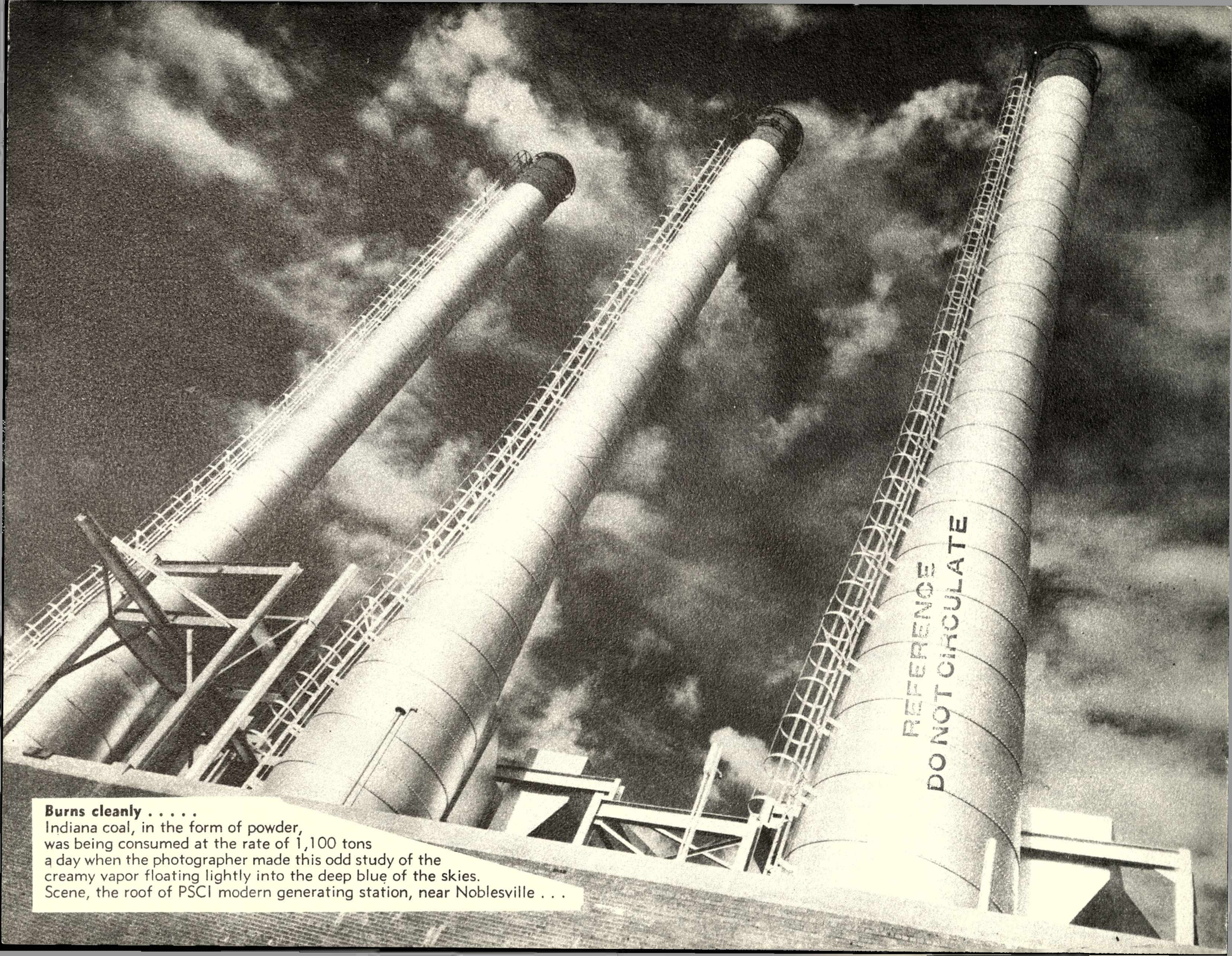
. . .

Cost per ton, up 102.68%

. . .

Increase, necessary to meet higher expense of production at the mines.

. . .



**Burns cleanly . . . . .**
Indiana coal, in the form of powder,
was being consumed at the rate of 1,100 tons
a day when the photographer made this odd study of the
creamy vapor floating lightly into the deep blue of the skies.
Scene, the roof of PSCI modern generating station, near Noblesville . . .

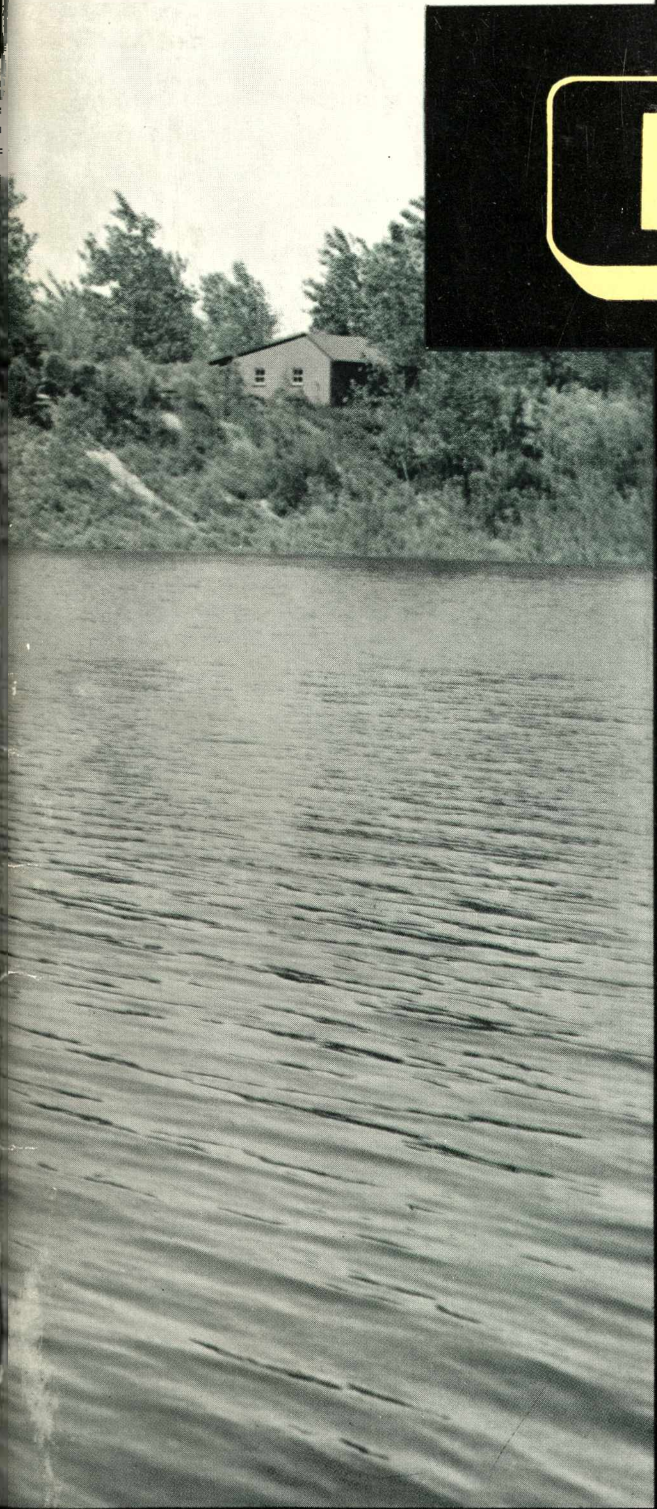
REFERENCE
DO NOT CIRCULATE

Indiana Coal

REF

REFERENCE
DO NOT CIRCULATE

# COAL



## AN INDIANA HERITAGE

# COAL

## AN INDIANA HERITAGE

Coal is one of Indiana's most valuable natural resources and coal mining is among the State's leading industries. The story of the Indiana Coal Industry and its many contributions to the economic development of the State is told in the words and pictures of this booklet.

INDIANA COAL ASSOCIATION
632 Cherry Street
TERRE HAUTE, INDIANA

# COVER

Three aspects of the Indiana Coal mining industry are shown on the cover of this booklet. On the front is a tipple and preparation plant serving a large shaft mine. On the back is one of the large shovels used in strip mining. The remainder of the cover illustrates what has been accomplished in land reclamation and utilization following strip mining. Typical of hundreds of similar areas in the coal mining territory, the banks have been revegetated and a home site has been developed on the man-made lake.

The Indiana Coal Association represents all of the major coal-producing companies operating in the State. It is a service organization providing technical and advisory assistance to its member companies and to the public. Assistance or information covering any phase of the production, sale or use of Indiana coals may be obtained by writing to: Indiana Coal Association, 632 Cherry Street, Terre Haute, Indiana.

# The Coal Industry of Indiana

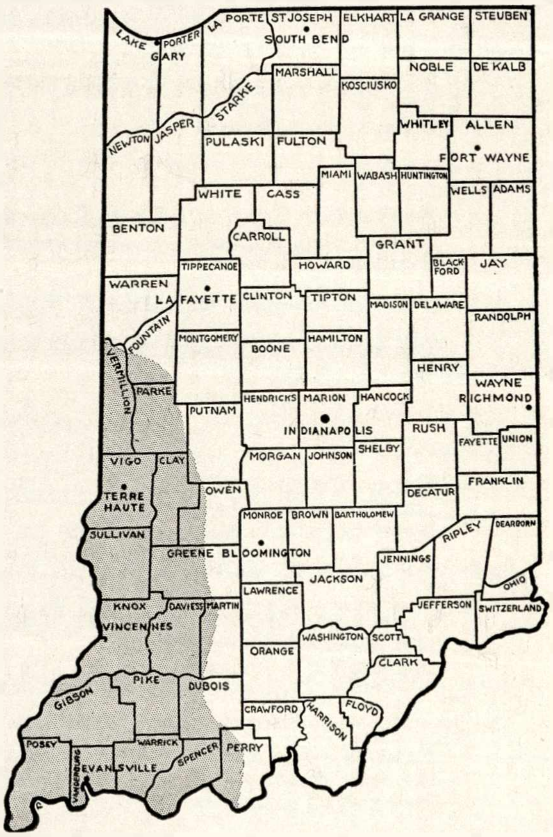
Air, water, food and light — four commonplace words that mean life. There is a fifth word, too, just as commonplace and universally used . . . COAL.

Man's greatest progress has been made since he learned to produce coal cheaply and in great abundance. If, through some great disaster, the world should be deprived of coal and the benefits it provides, man's present way of living would become impossible. Substitute sources of energy — oil, natural gas and water power — could not fill the gap.

Coal is the major source of energy for the vast enterprises which make America the greatest industrial nation in the world. Coal's leadership among energy resources is evidenced by the fact that 70 per cent of the electricity produced in the United States is generated by coal-fired equipment. Looking to the future, coal represents 84 per cent of this nation's reserves of fossil fuels.

Indiana is one of the great coal-producing areas of the United States. Coal mining is one of Indiana's oldest and most important industries and although the State has produced this essential product for many years its enormous coal reserves are ample for generations to come.

Indiana's coal mines are among the most modern and efficient in the world and its operators have pioneered many of the industry's modern production methods. Underground mines in Indiana are second to none. They are well-lighted and ventilated and are equipped with modern coal producing machinery. Indiana's coal miners are highly-skilled workmen whose families, in many cases, have included generations of miners.



**Millions of years ago, Mother Nature, with her usual lavish hand, spread coal over wide areas of the United States. Indiana's share was deposited in the shaded areas comprising all or part of 19 counties in the southwestern part of the state.**

Strip-mine operators of Indiana are pioneers in this type of mining and utilize some of the largest and most modern electrically-powered equipment available. Recognized for their important contributions to the technology of strip mining, they are also acknowledged leaders in conservation and land reclamation. At all of Indiana's strip mines, disturbed lands are restored to productive and valuable uses after mining operations are completed.

Safety is the watchword in both strip and underground mines. Through the cooperative efforts of mine operators and miners, Indiana has one of the most efficient mine safety programs in the nation.

The production of Indiana coal is flexible and the industry is prepared to meet any demands placed upon it by industrial requirements or national emergency.

As technological advances have been made in coal mining, the industry has passed on to the public a better and more economical product. At the same time, the producers have been able to pay higher wages and improve working conditions to a degree which might have seemed visionary a generation ago.

With pride in the present and confidence for the future, the members of the Indiana Coal Association take pleasure in presenting this pictorial story of **COAL—An Indiana Heritage.**

# INDIANA COAL ASSOCIATION

Ayrshire Collieries Corporation
Big Four Building
Indianapolis 4, Indiana

Blackfoot Coal and Land Corporation
Citizens Bank Building
Evansville 8, Indiana

Boonville Collieries, Inc.
Big Four Building
Indianapolis 4, Indiana

Enoco Collieries, Inc.
1405 Merchants Bank Building
Indianapolis 4, Indiana

Enos Coal Mining Company, The
1405 Merchants Bank Building
Indianapolis 4, Indiana

Fairview Collieries Corporation
Big Four Building
Indianapolis 4, Indiana

G & F Corporation
Box 332
Brazil, Indiana

Ingle Coal Corporation
P. O. Box 37
Elberfeld, Indiana

Lone Star Coal Company
Box 332
Brazil, Indiana

Lynnville Coal Company
114 West 11th Street
Kansas City 5, Missouri

Maumee Collieries Company
444 South Sixth Street
Terre Haute, Indiana

Morgan Coal Company
2850 North Meridian St.
Indianapolis 8, Indiana

Princeton Mining Company
111 North Seventh Street
Terre Haute, Indiana

S. A. Coal Corporation
R. F. D. #1
Dugger, Indiana

Shasta Coal Corporation
6 North Michigan Avenue
Chicago 2, Illinois

Sherwood-Templeton Coal Company
2829 North Meridian Street
Indianapolis 8, Indiana

Snow Hill Coal Corporation
Merchants National Bank Building
Terre Haute, Indiana

Sunlight Coal Company
114 West 11th Street
Kansas City 5, Missouri

Tecumseh Coal Corporation
114 West 11th Street
Kansas City 5, Missouri

Victoria Coal Corporation
114 West 11th Street
Kansas City 5, Missouri

Viking Coal Corporation
Merchants National Bank Building
Terre Haute, Indiana

# Mining Methods

The coal industry of Indiana utilizes both underground and strip mining techniques to extract coal from the earth. In underground mining, as the name implies, coal is recovered by operations which are carried out entirely beneath the surface. In strip mining, the soil and rock overlying the coal are removed to expose the top surface of the seam.

## Underground Mining

Underground mines are classified as drift, slope or shaft operations depending upon the method used to reach the coal seam from the surface of the earth. Drift mines, in which the entry is driven more or less horizontally through the seam, are common in mountainous areas but are rarely found in the mid-western coal producing districts. Several of Indiana's major underground mines are slope operations in which the entry is a gradual incline from the surface to the coal seam below. Most of Indiana's deep-mined coal, however, comes from shaft operations. In these mines the vertical shafts range from as little as 20 to nearly 600 feet in depth. Although the average depth of shaft mines in Indiana is about 160 feet, mines in which the coal lies between 400 and 500 feet below the surface produce most of the coal recovered by this method of mining.

Underground mining is today, and has been in the past, an important part of Indiana's coal industry. Since by far the greater portion of the State's recoverable coal reserves lie deeply in the earth, this method inevitably will assume increased importance in years to come.

## Strip Mining

Strip mining has a number of advantages over underground mining. In a strip mine there is no roof to support and adequate lighting and ventilation are provided by nature. Communications are greatly simplified by the absence of the many widely-separated working places common to all but the smallest underground operations. Lack of space, which imposes severe limitations on the size and capacity of underground mining and haulage equipment, is not a factor in the selection or operation of equipment in strip mines. Recovery of coal in strip mines approaches 100% since it is not necessary to leave unrecoverable pillars of coal as is done in underground mines. Because of these advantages strip mining is a more efficient and economical method of mining coal wherever the thickness and geological character of the material covering the coal seam, usually called the "overburden", permit its use.

Coal can be recovered by strip mining only if the seam is no more than 60 to 80 feet beneath the surface of the earth. Except under unusual and usually temporary conditions this represents the maximum depth to which today's strip mining machinery is capable of removing and relocating the soil and rock over the coal. This maximum figure may be severely decreased in the case of thin seams of coal and where surface and geological conditions are irregular or unusual. Future developments in equipment and techniques will undoubtedly extend somewhat the depth at which coal can be recovered by strip mining and will permit recovery by this method of a greater percentage of Indiana's reserves.

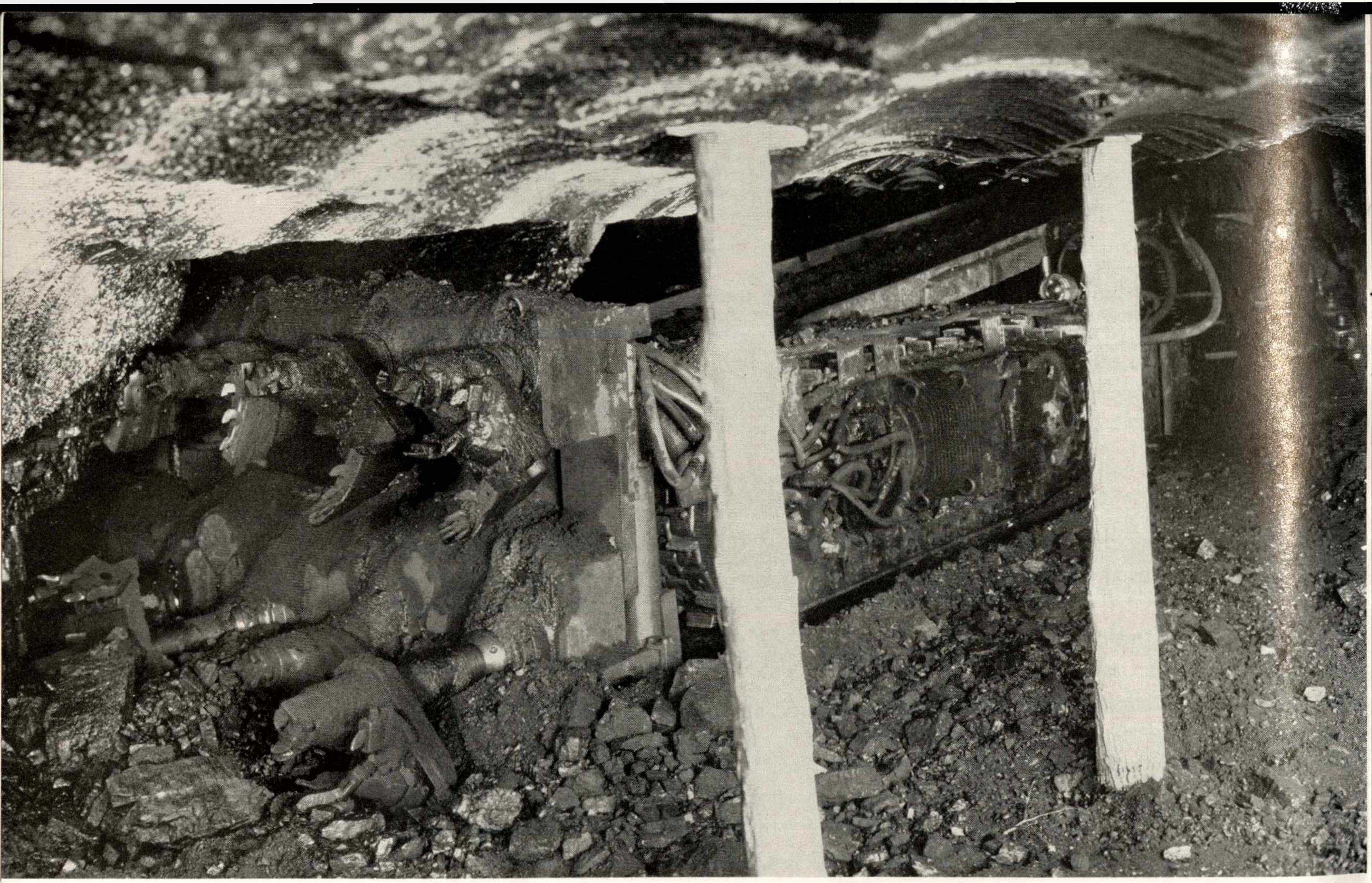


*Photo courtesy Jeffrey Mfg. Co.*

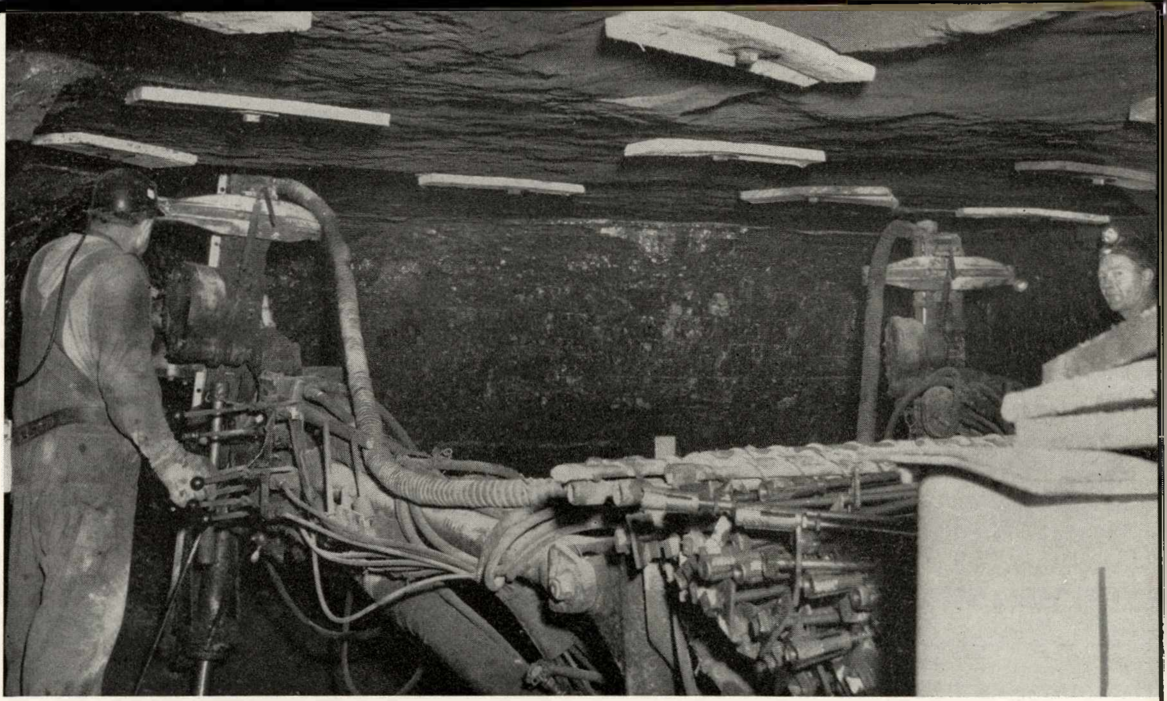
One of several designs of continuous mining machines used in Indiana mines, the "Colmol" cuts and loads coal into shuttle cars as it moves through the seam. Continuous miners eliminate the cutting, drilling and shooting operations of the conventional underground mining cycle.

# Underground Mining

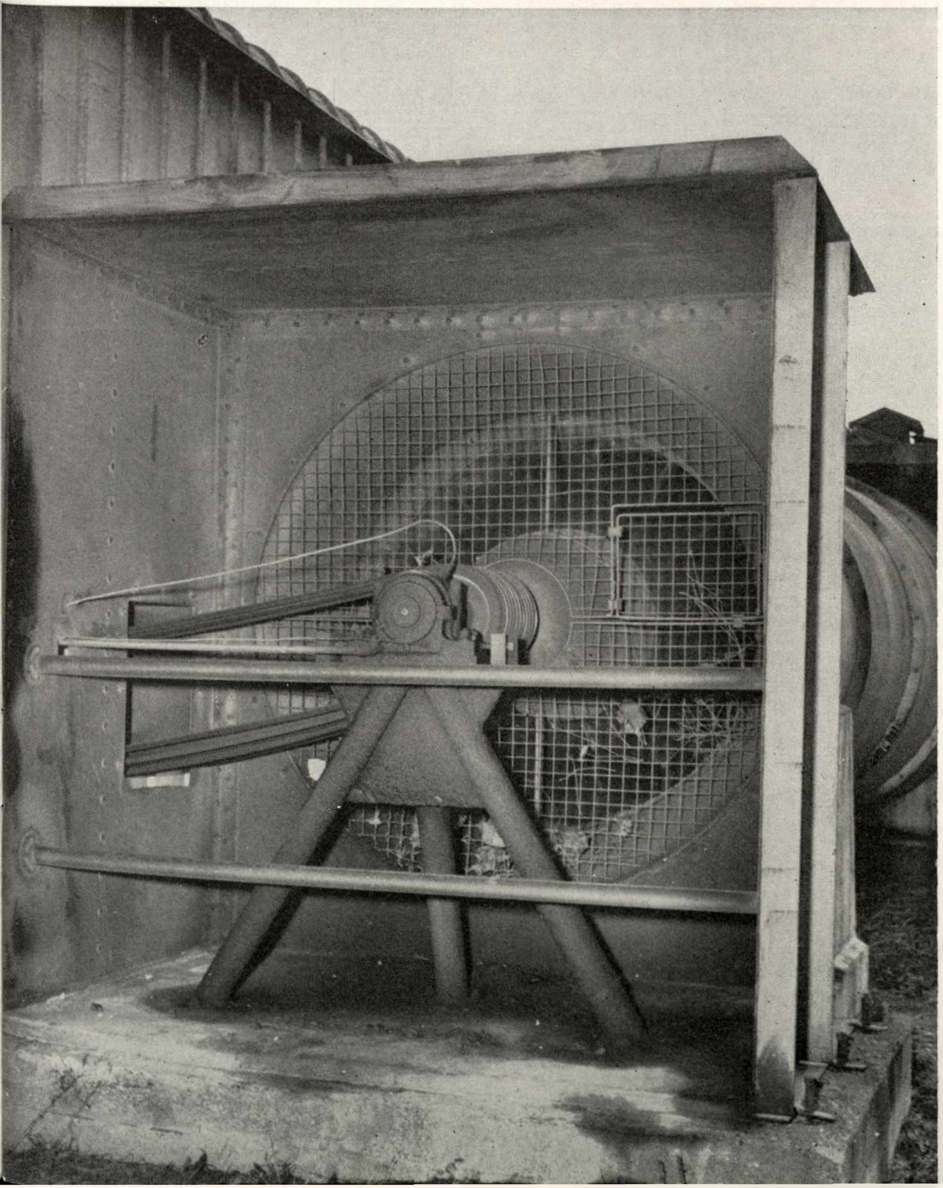
About one-third of Indiana's coal production comes from underground mines. New mines are opened each year to replace those which have been worked out and to meet the constantly increasing demand for coal in the industrial middlewest.

A modern underground mine consists of many working places connected by miles of railroad track over which electric locomotives haul trainloads of coal, equipment and supplies. Special "man-trips" are scheduled to transport miners to and from their working places. Both visual signals and radio communication are used to dispatch and control the movement of trains within the mine. Modern underground mining is completely mechanized. Powerful machines, operated by highly-skilled miners, perform the various steps in the mining cycle rapidly, efficiently and safely.

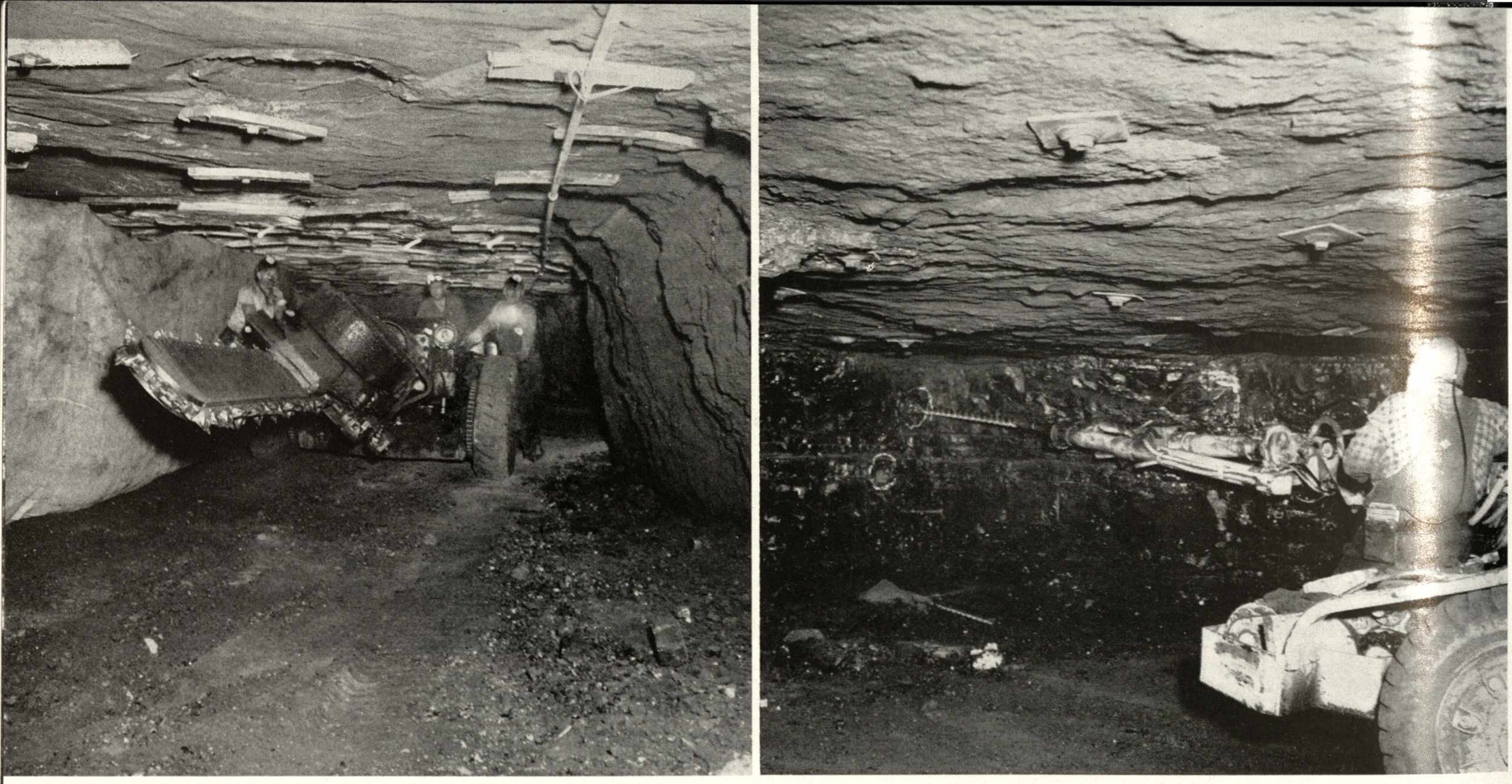
Safety is the most important aspect of underground mining and in this respect Indiana mines are outstanding. In a coal mine "safety is everybody's business" and Indiana's mine safety program enjoys the whole-hearted support and cooperation of the producers, mineworkers, and State and Federal Mine Bureaus.



Roof Control — Underground mining is possible only when the roof above the coal is adequately supported. In many mines props or timbers are used to prevent the fall of rock or slate. The modern technique of roof-bolting provides a firm, safe roof with the advantage of permitting the unobstructed movement of mining machinery. The bolting machine shown here is designed so that the operators at no time work under unsupported roof.

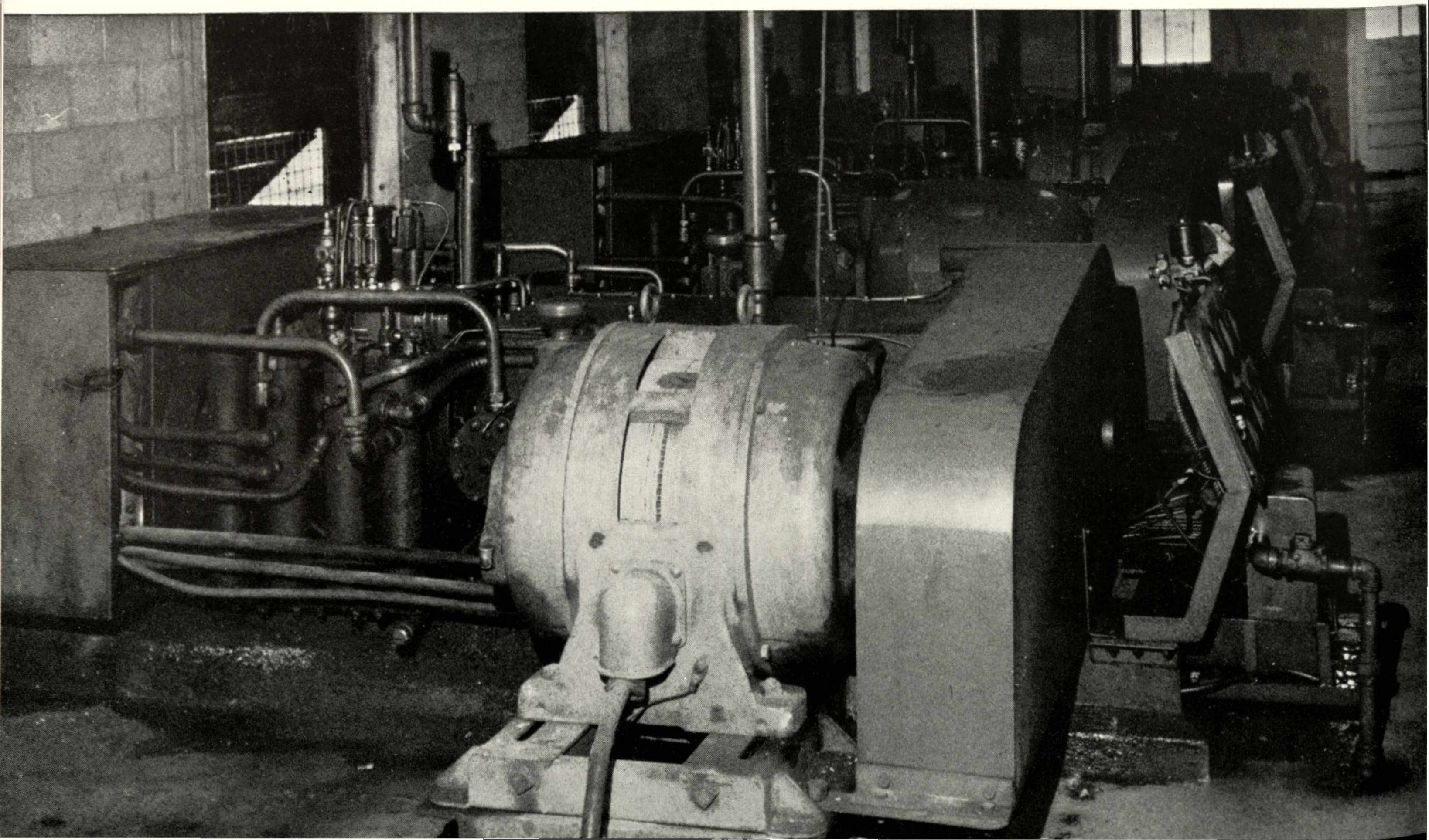


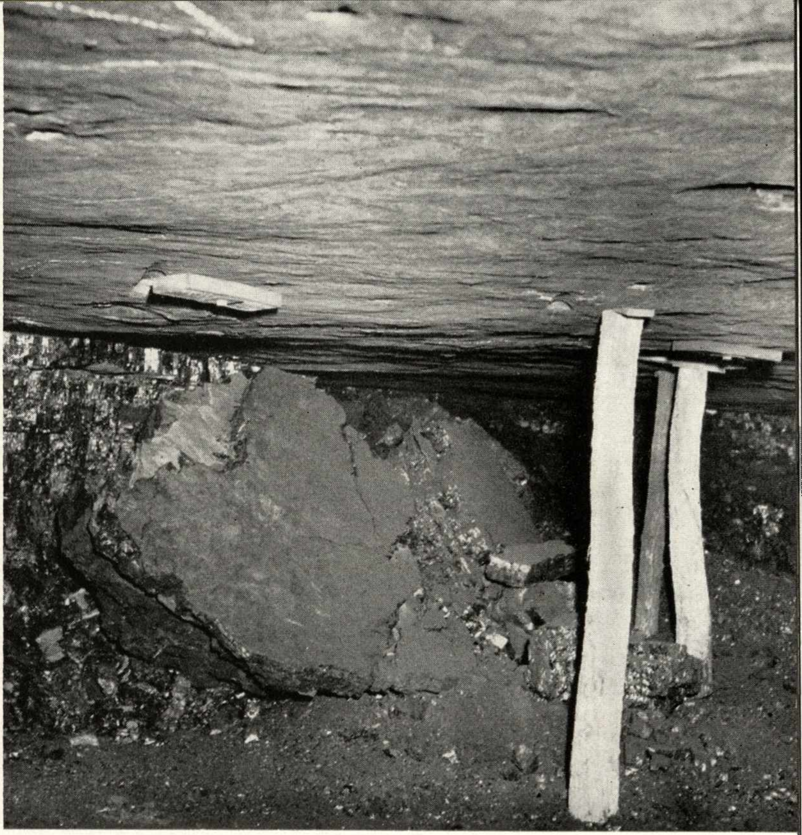
Ventilation — Driven by a 100 horsepower electric motor, this huge ventilating fan delivers a continuous supply of fresh air to a shaft mine at the rate of 125,000 cubic feet per minute. Adequate ventilation, besides making working conditions more comfortable, insures that the mine is kept free of any toxic or inflammable gases which might otherwise constitute a safety hazard.



Cutting and Drilling — In the conventional mining cycle, a cutting machine first undercuts the coal to a depth of about eight feet. After cutting, holes are drilled in the face of the coal to receive explosive charges.

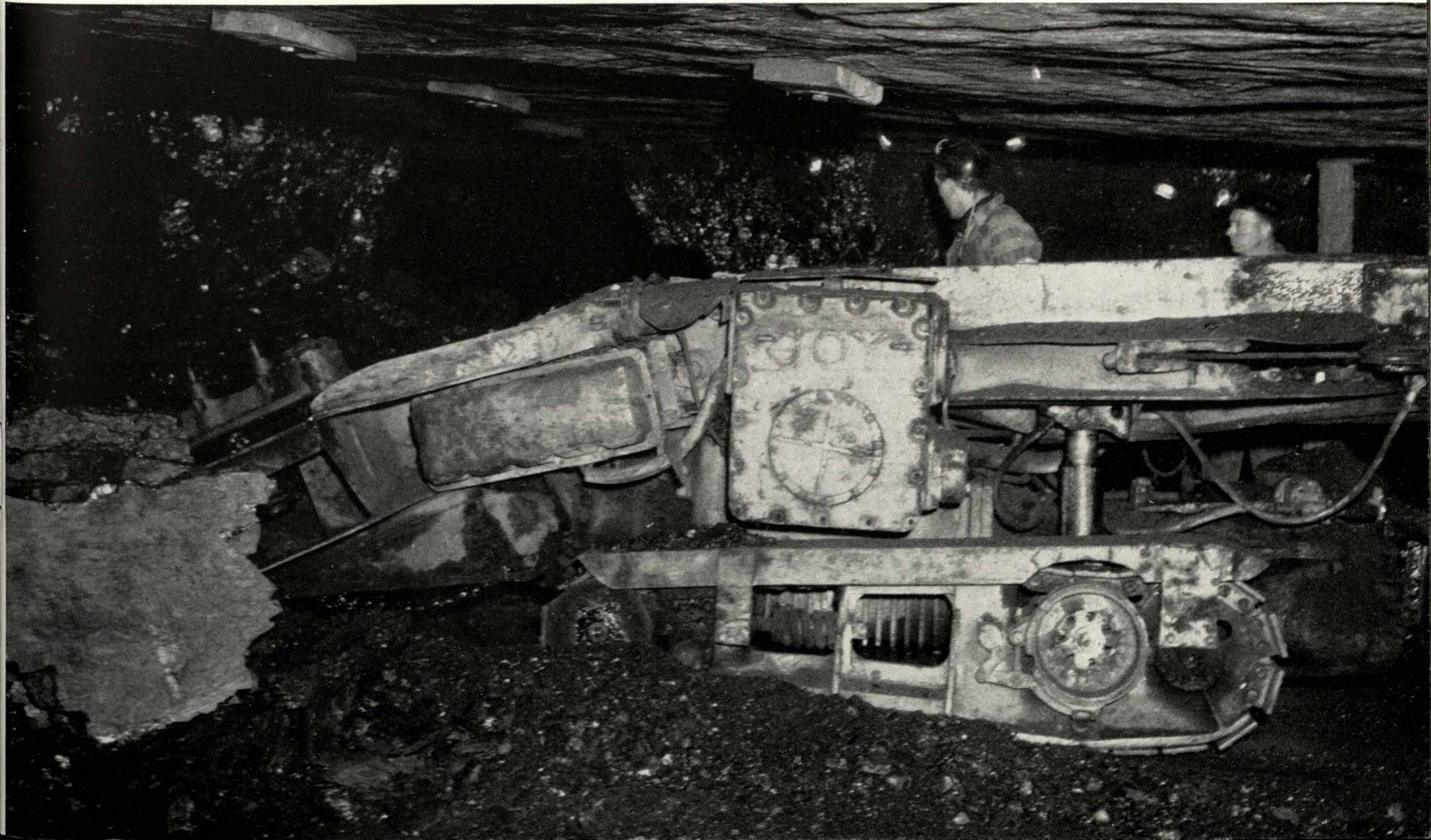
Air Compression—Compressors used with the "Airdox" system of shooting coal supply compressed air to the working face through high-pressure piping at pressures in excess of 10,000 pounds per square inch.

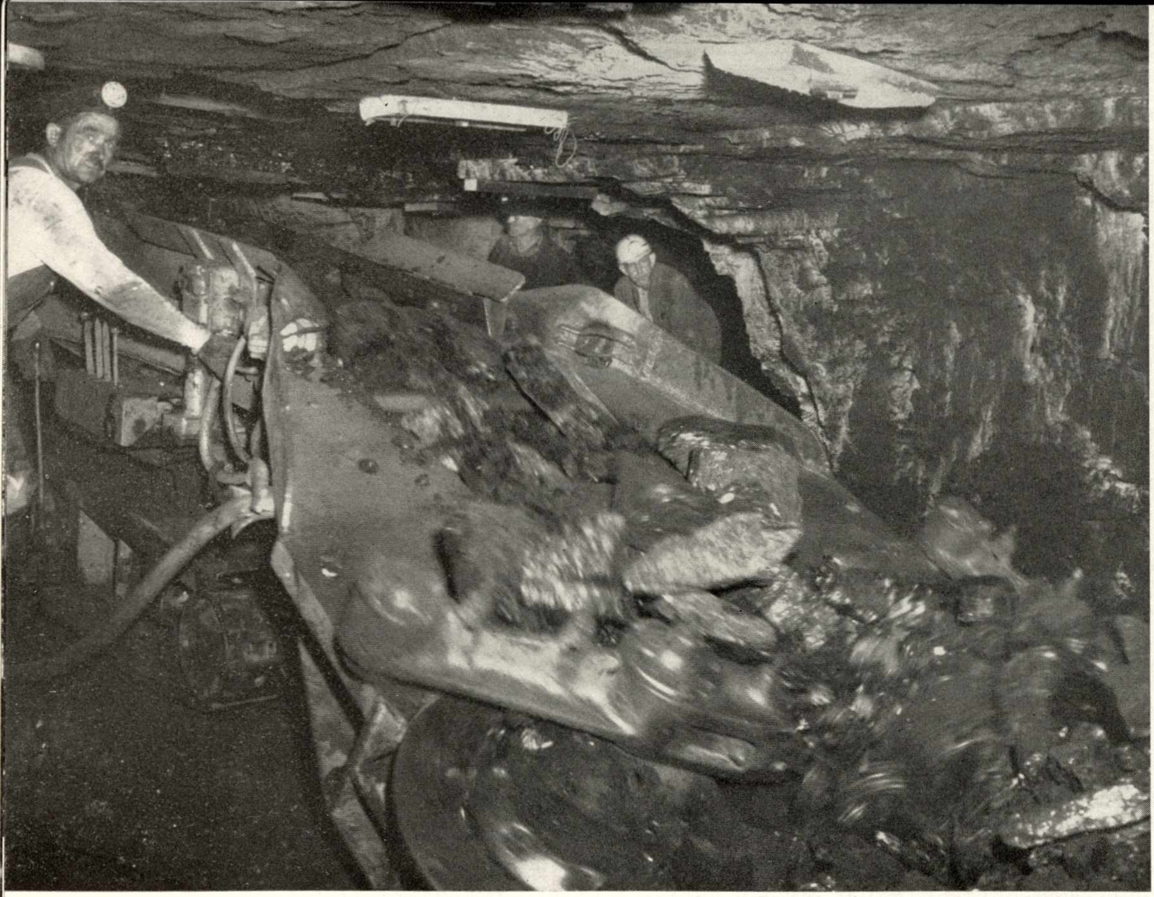




Shooting—Explosives or compressible gases such as air and carbon dioxide are used to break coal from the solid face. The "Airdox" method shown here utilizes the rapid expansion of compressed air to shoot the coal without fire hazard or release of noxious or toxic gases.

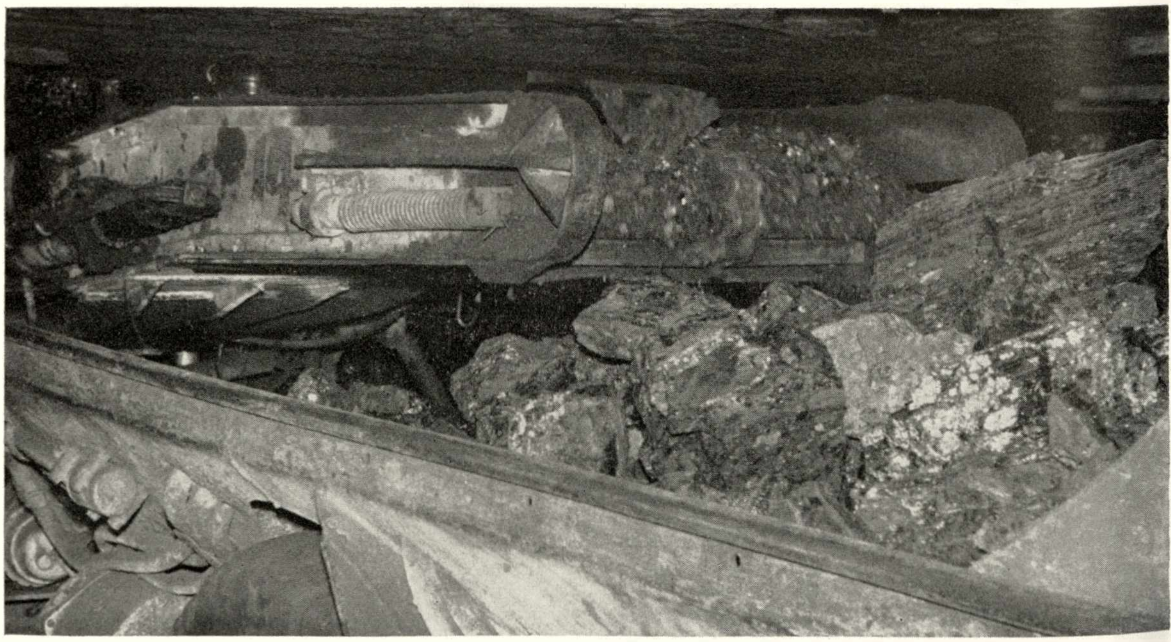
Loading—The heart of mechanized underground mining is the mechanical loading machine. This mobile loader gathers the coal shot from the working face, transports it the length of the machine on a built-in conveyor belt, and discharges it into a waiting shuttle car.

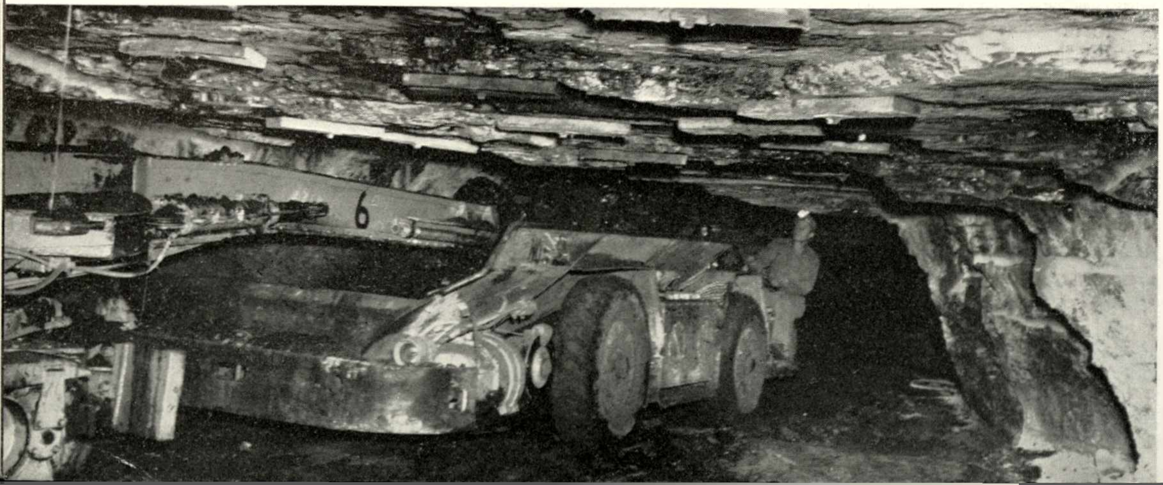




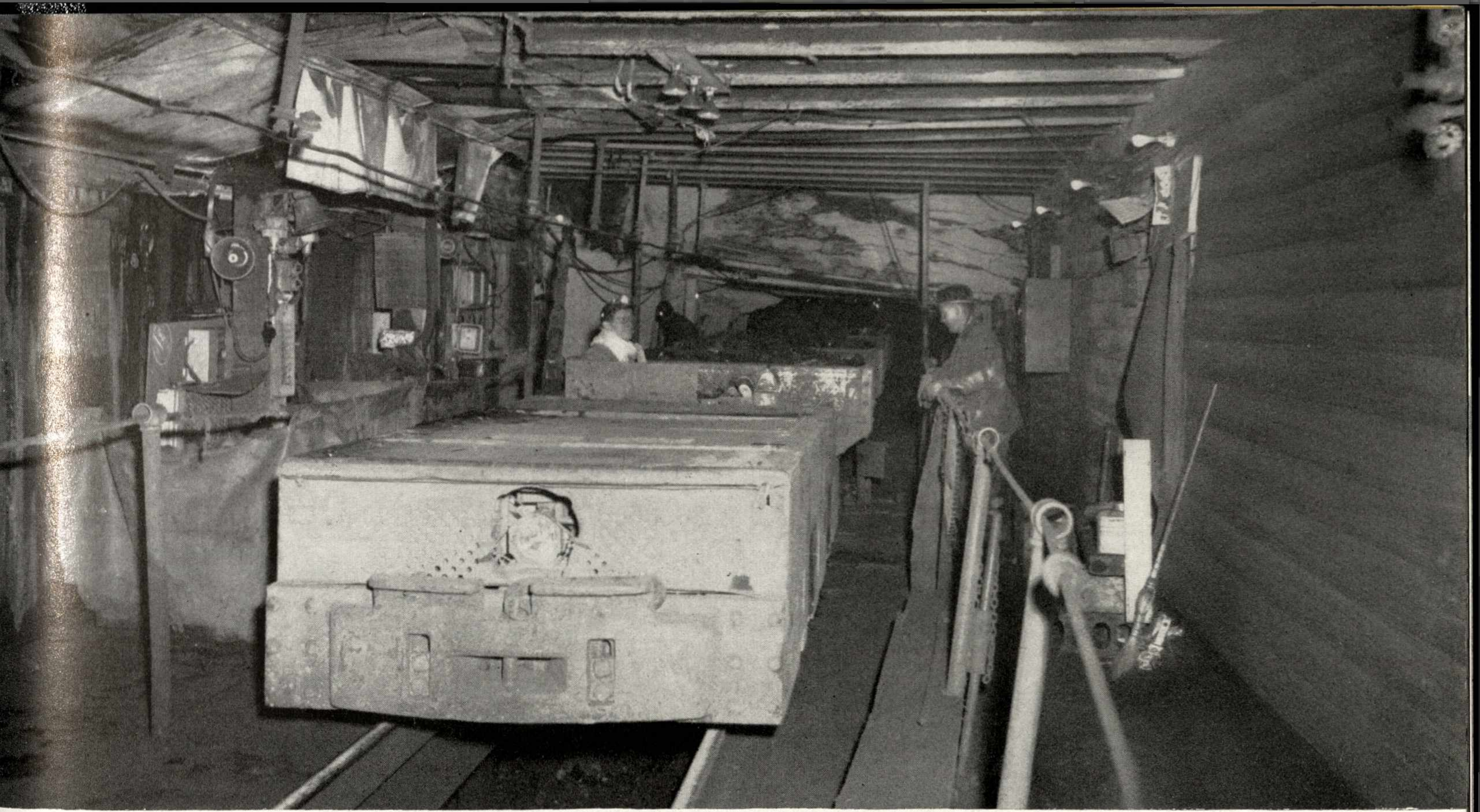
Operation of the mechanical loading machine is clearly illustrated here. Gathering arms scoop the coal onto a conveyor belt . . .

. . . which discharges into the hopper of a shuttle car positioned under the rear end of the loader. Once loaded . . .



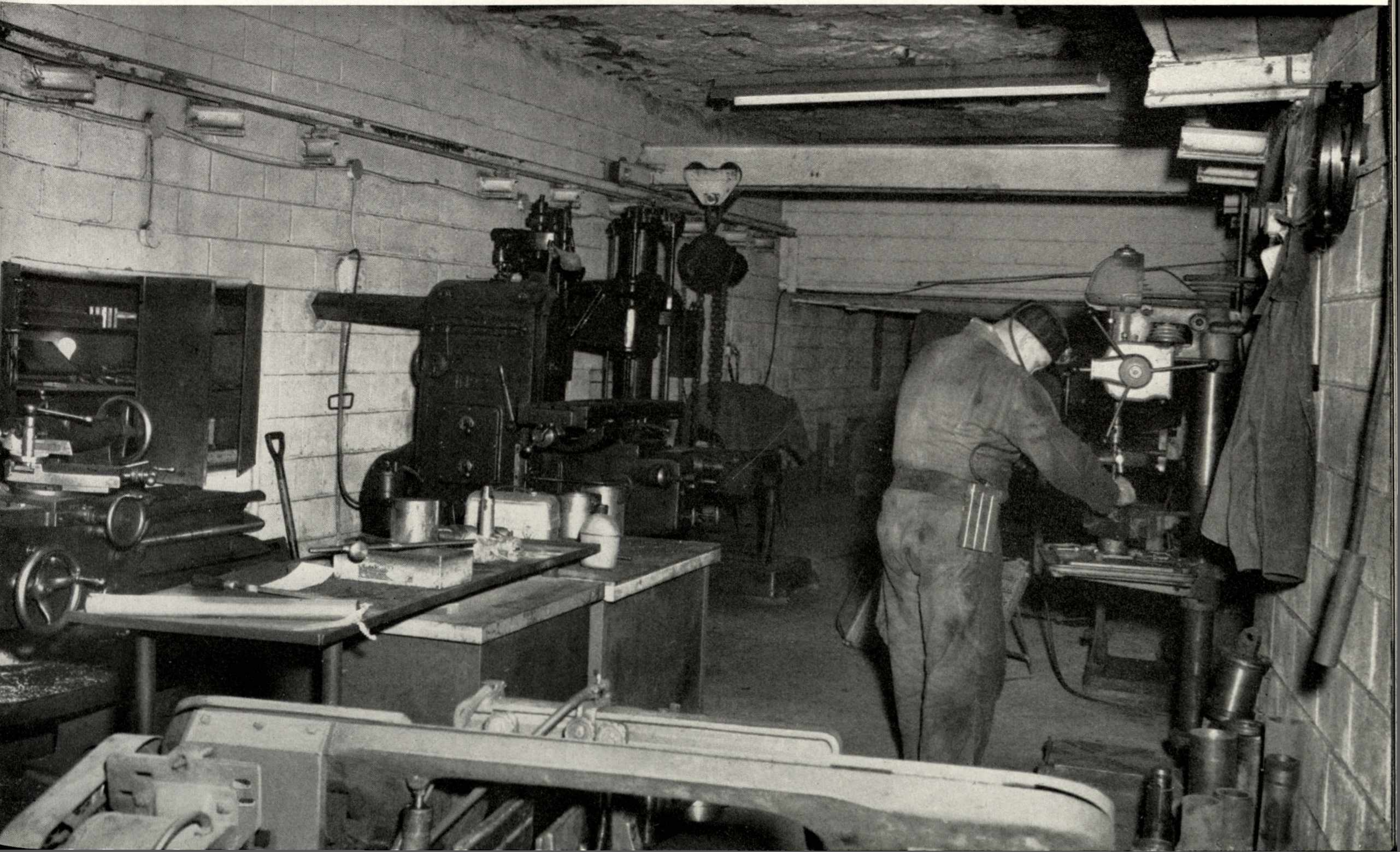


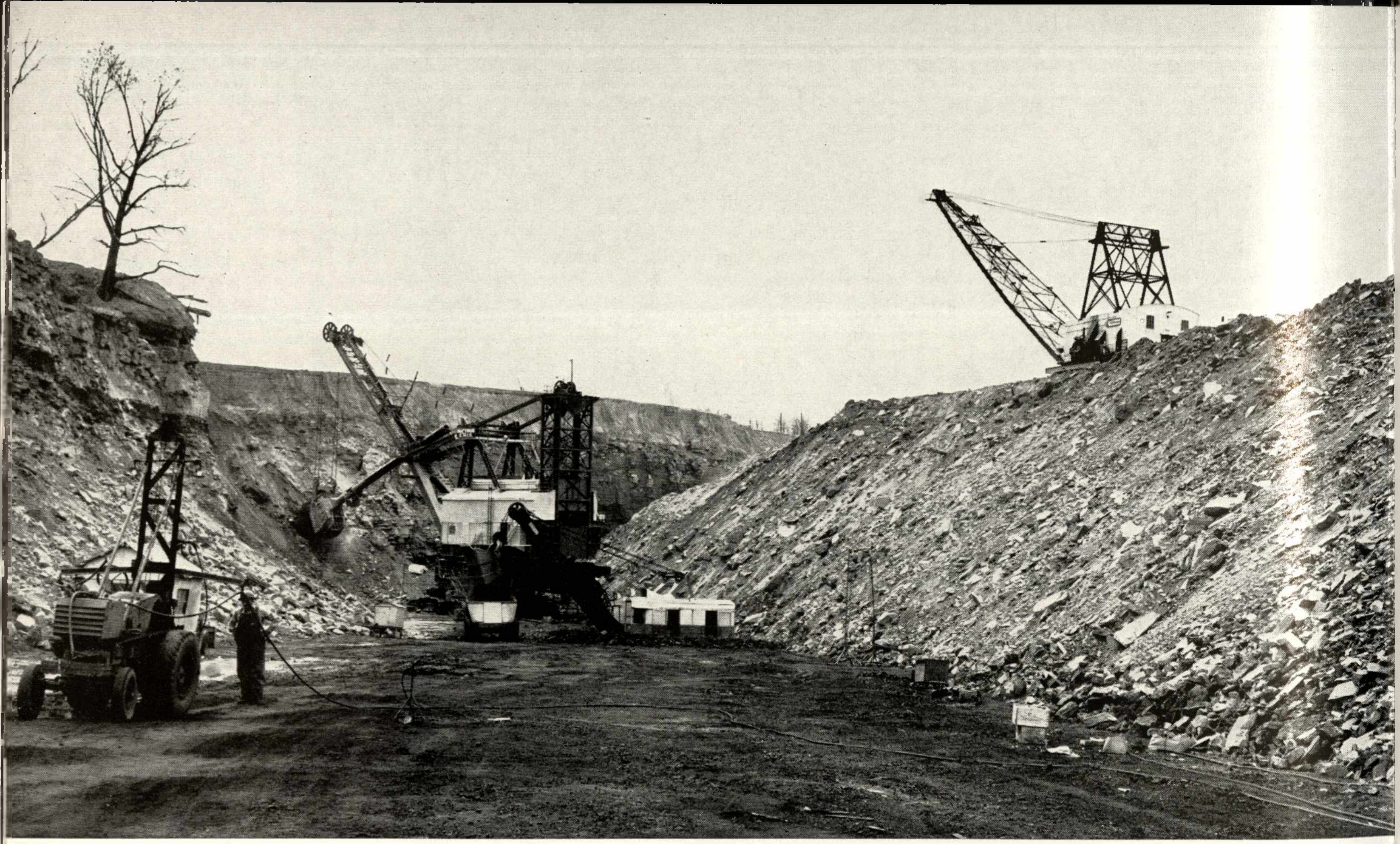
. . . the shuttle car carries the coal to mine cars assembled at a loading point serving a number of working places.



Hauling—Loaded mine cars are hauled by powerful electric locomotives to a dumping point at the bottom of the mine shaft, as shown here, or directly to the preparation plant in the case of many slope and drift mines.

Maintenance—To insure maximum availability of equipment, this shop is located at the bottom of a mine shaft, 450 feet below the earth's surface. Facilities are adequate for repair and overhaul of the largest coal mining machinery.





**A tandem stripping operation typical in Indiana. In the pit, the large stripping shovel removes the overburden and deposits it on the spoil bank where it is distributed by the dragline. Also shown in the pit are a coal drill, loading shovel and haulage truck.**

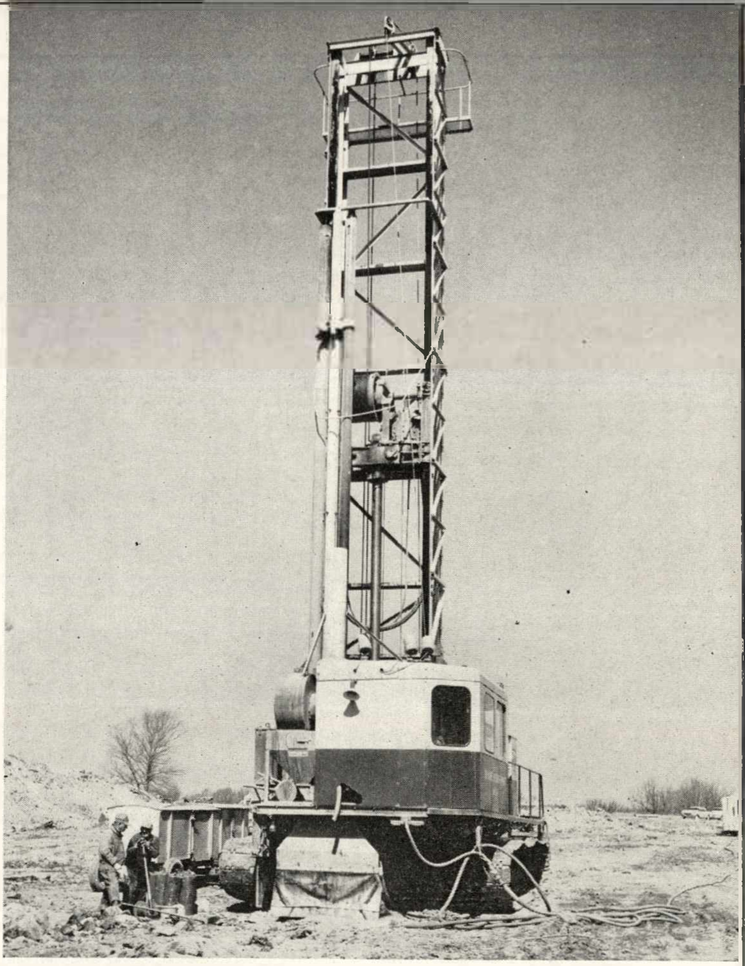
# Strip Mining

Indiana, richly endowed with coal reserves close to the earth's surface, is among the nation's leading states in the strip mining of coal. Indiana's operators were among the earliest in the country to take advantage of the efficiency and economy of strip mining and have contributed greatly to the development of methods and equipment used throughout the coal mining industry.

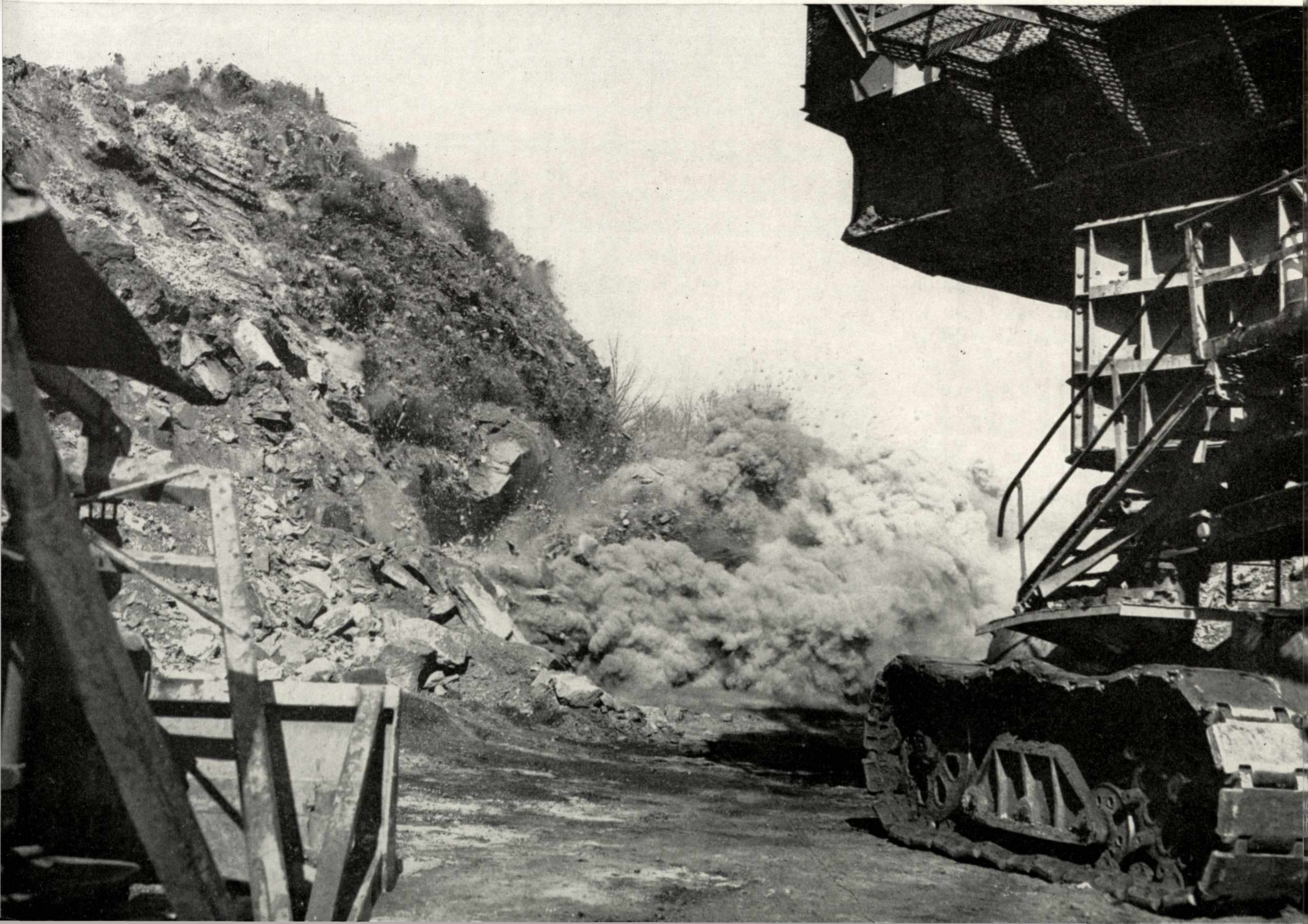
Today about two-thirds of Indiana's annual coal production comes from strip mines. In these mines huge quantities of rock and soil are removed to uncover the coal seams. In Indiana, stripping shovels and draglines capable of moving 30 to 45 cubic yards of overburden in a single bite are common and even larger machines will soon be in use. Loading shovels with buckets holding from 5 to 10 cubic yards of coal keep many 20 to 50-ton haulage trucks shuttling from pits to preparation plants. In addition to stripping, loading and hauling, the strip mining cycle includes drilling and shooting of both overburden and coal.

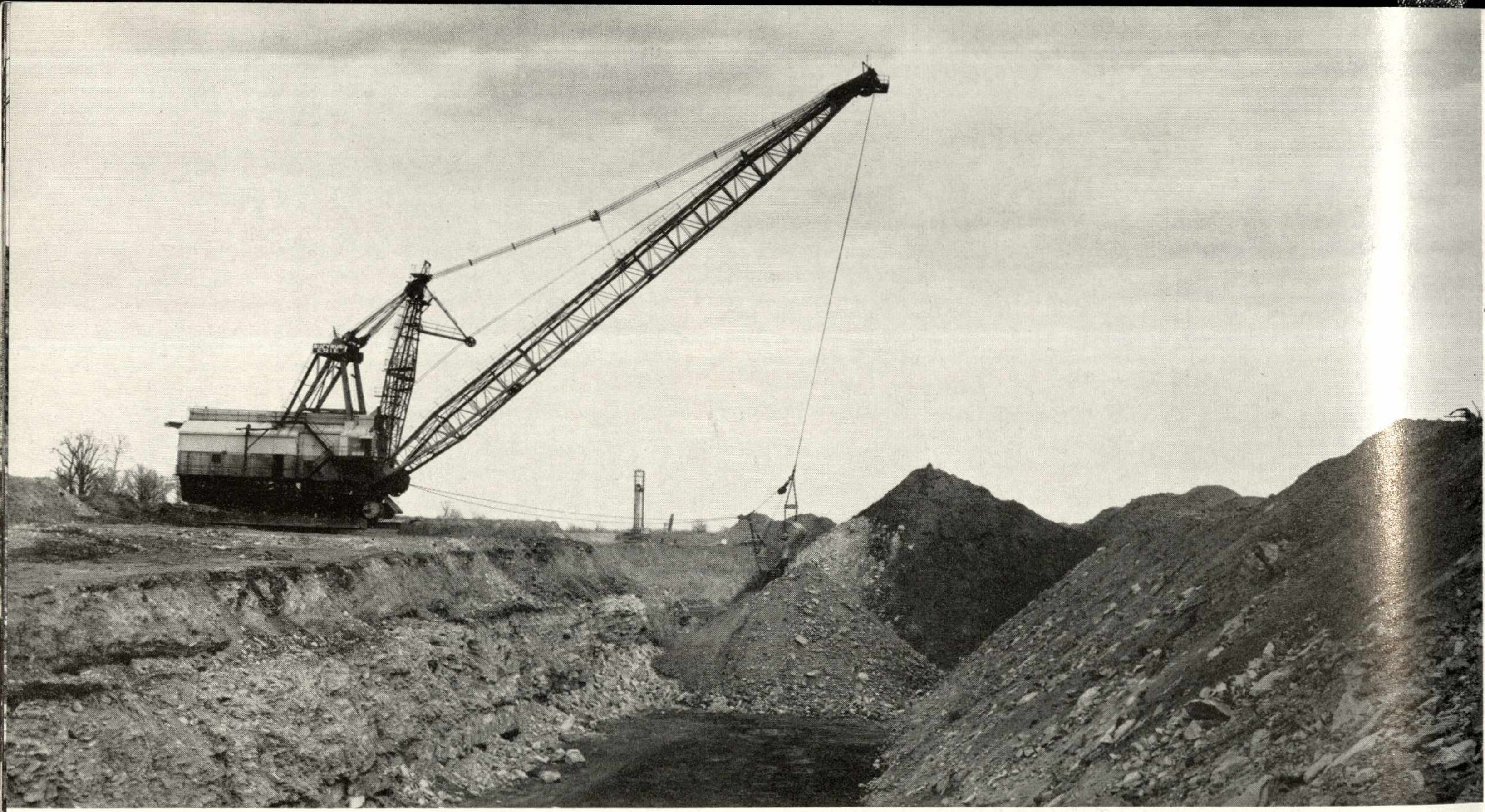
Indiana's strip-mined coals, economically mined, thoroughly cleaned and carefully sized, are purchased with confidence and used with satisfaction throughout Indiana and other midwestern states.

Drilling — Holes to receive explosives are drilled through the overburden in a carefully planned pattern from the surface to the top of the coal seam as shown here. In overburden of moderate thickness the holes may be drilled horizontally from the floor of the pit.

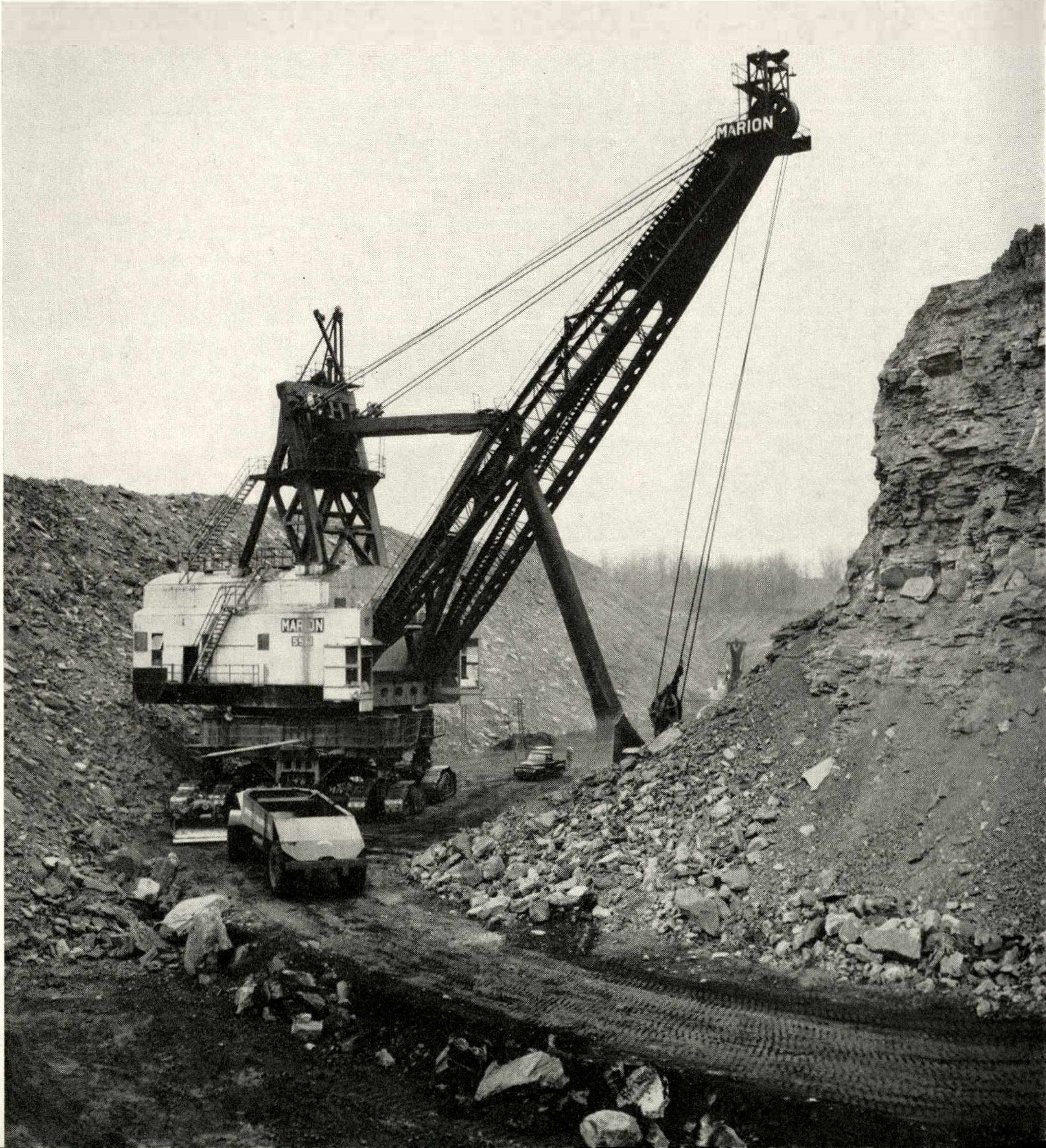


Shooting — Explosives are used both to displace the overburden and to break it into fragments small enough for convenient handling by the stripping shovel and dragline.



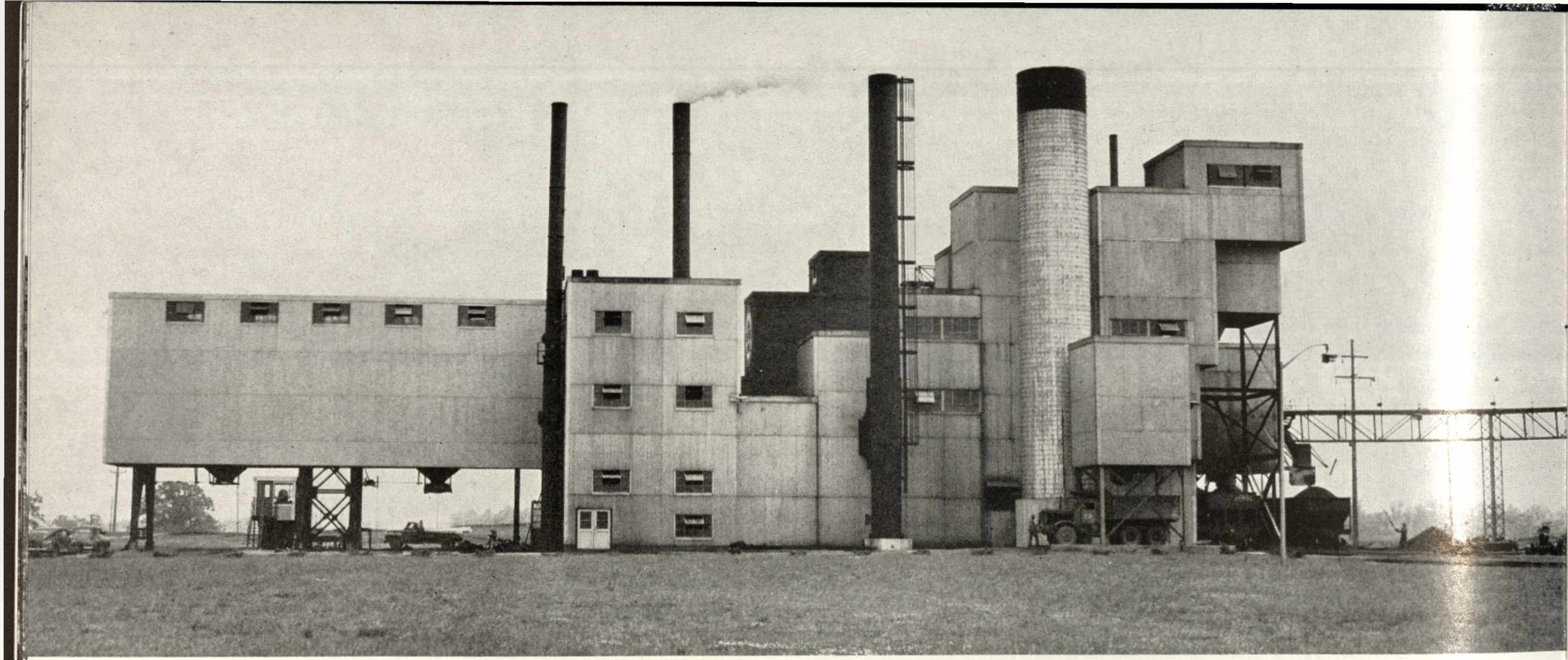


Stripping — The overburden shot from the highwall is removed from the pit in several ways. Thickness and composition of the overburden determine the most suitable method. In some operations (above) a dragline working from the highwall deposits the material across the pit in the spoil area. In others, a single shovel operating from the floor of the pit carries the material from the pit to the spoil bank. In very heavy overburden, a tandem operation is often employed in which a shovel in the pit deposits the material on the edge of the spoil bank to be pulled back and distributed by a dragline.



Loading — After the surface of the seam is thoroughly cleaned, the coal is broken by explosives and loaded into large haulage trucks.

Hauling — A 50-ton truck hauling coal from pit to preparation plant on a company-owned road through an area mined and reforested many years ago. A number of trucks are used to keep both loading shovel and tipple in continuous operation.



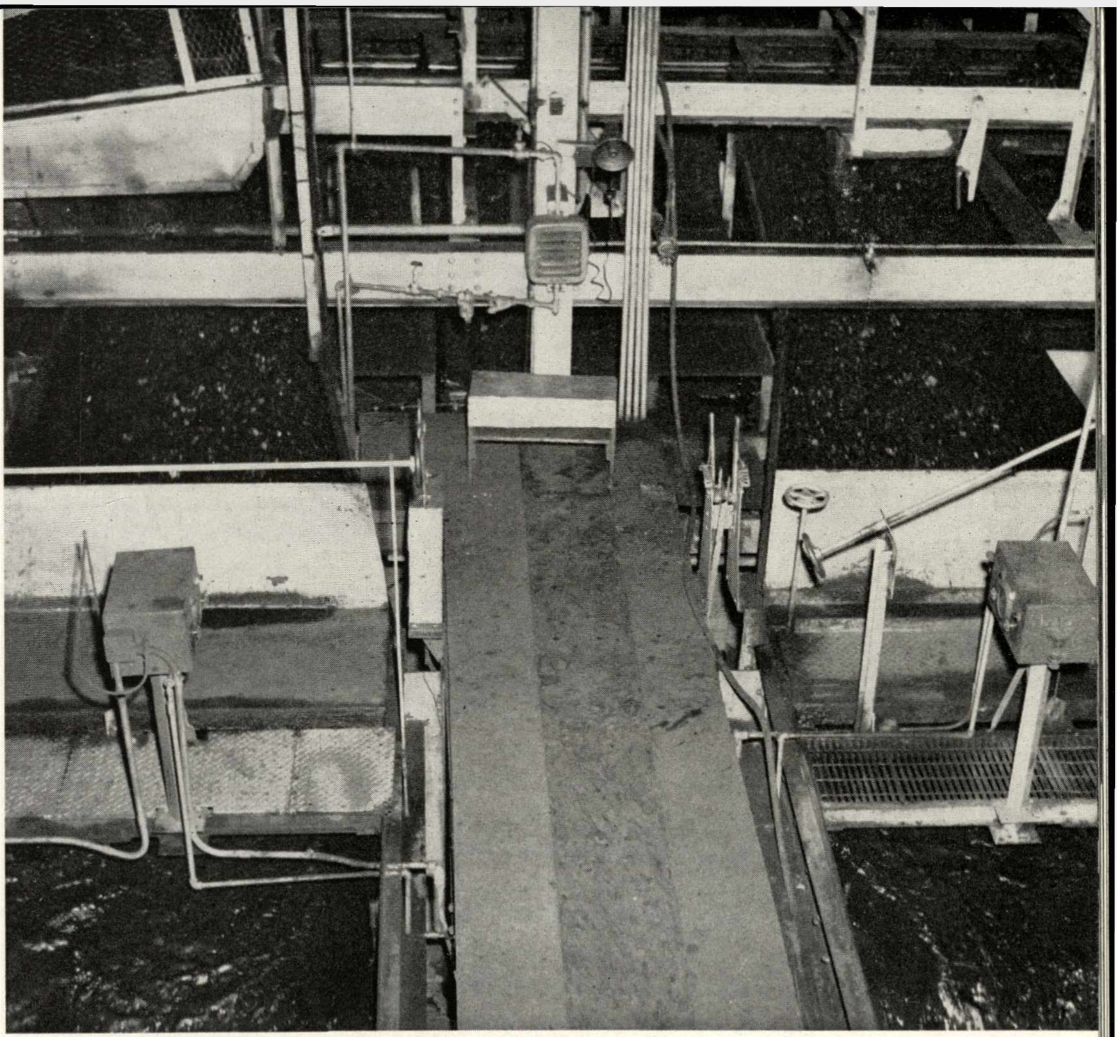
Typical of Indiana's most modern preparation facilities, this plant serves one of the state's newest and largest strip mining operations.

# Coal Preparation

As it lies in the earth, coal is but a raw material which must be processed in elaborate preparation plants to provide products tailored to fit the specific needs of a great variety of consumers. The first function of a modern coal preparation plant is to remove rock, shale, clay and other impurities from the raw coal delivered from the mine. Clean coal is then dried, crushed, sized and blended into various grades and sizes best-suited for use in different types of coal-burning equipment. Automatic control systems and rigid schedules of sampling and testing insure that each grade of coal will be completely uniform in quality and sizing. Pioneers in many other phases of coal production, Indiana operators were early leaders in the field of coal preparation. As a result, the percentage of total coal production processed in modern preparation plants in Indiana is as high, or higher, than in any other coal-producing district in the nation.

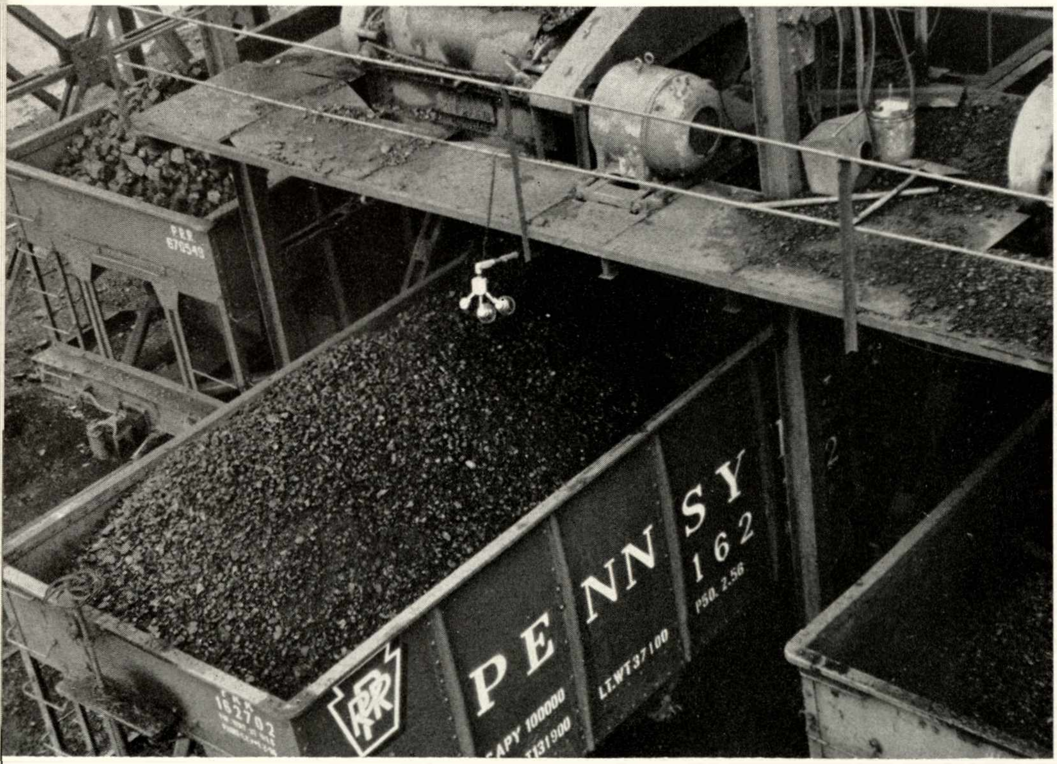
Quality control plays an important part in the production of Indiana coals and well-equipped laboratories are essential to modern preparation plant operation. Skilled technicians perform thousands of analyses each year to insure consumers of consistent quality and uniformity in sizing.

Cleaning coal of rock, slate and other impurities is the basic function of the modern coal preparation plant. Cleaning processes may employ water, as illustrated here, air, chemical solutions, or mixtures of water and finely-ground solids but all of them depend upon the difference between the weight of coal and the various impurities to separate the raw coal into clean coal and refuse.



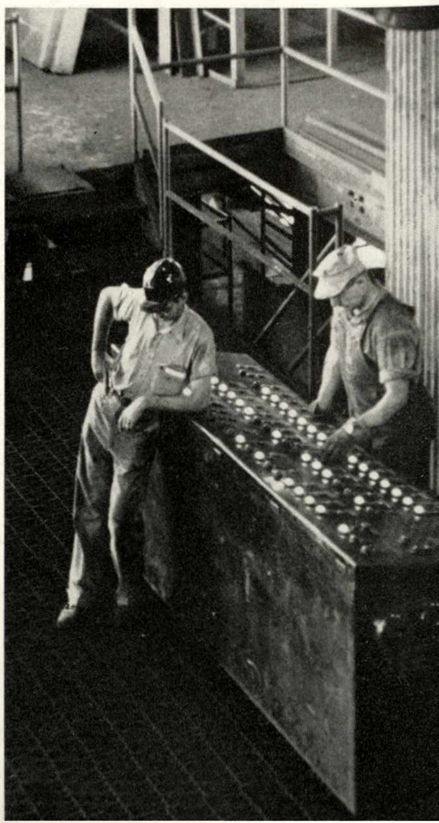
Separation of coal into various size classifications is another important function of the preparation plant. Many different types of screens, having openings ranging in size from as little as 1/8-inch to 6 or 8 inches, may be used in a single preparation plant.

In the preparation plant various sizes of coal may be blended together in definite proportions to provide a single preparation designed to meet the specific requirements of a particular type of coal-burning equipment. Shown here are conveyor belts carrying three different sizes of coal from heat dryers to blending bins.



Most of the coal produced in Indiana is loaded into railroad cars, barges or trucks at the preparation plant. A careful check is maintained to insure that each shipment will contain the kind and size of coal ordered by the buyer.

A typical central control panel of a modern coal preparation plant. All equipment in the plant is operated from the panel by the flick of a switch or push of a button.



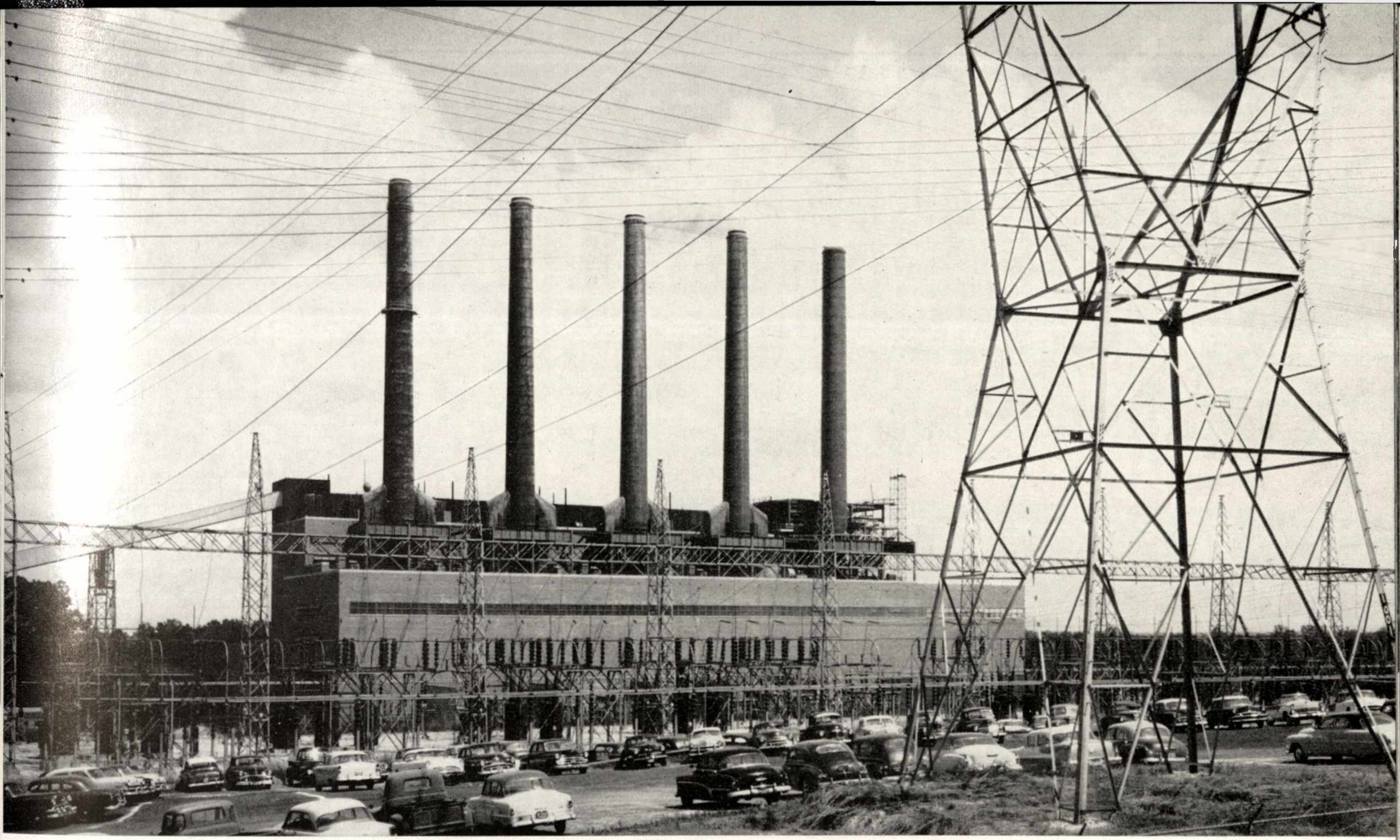


*Photo Courtesy Public Service Co. of Indiana.*

**Indiana coal is used in this large electric generating station to provide homes and industries with low cost electric power.**

# Sale and Use of Indiana Coals

Millions of tons of Indiana coal are consumed each year. It is burned in a great variety of equipment from the small home heating plant to the huge pulverized coal-fired boilers of electric generating stations.

Hourly fuel consumption in individual coal-burning units may average from a fraction of a pound to well over 100 tons. Indiana coals perform with equal satisfaction and economy in both large and small plants.

Consumer satisfaction with Indiana coals is due in part to the efficient methods of mining and preparation used by the producers. However, the finest product cannot provide complete satisfaction unless it can be used efficiently and economically. Salesmen and combustion engineers representing Indiana coal producers provide buyers and plant engineers with technical information on the selection and use of grade, size and preparation best suited to burning equipment and operating conditions. Careful selection and use of the proper Indiana coal gives the consumer maximum efficiency and economy in plant operation.

Consumers of Indiana coal may secure advice and technical information on coal selection and use from the Indiana Coal Association or from representatives of any of its member companies without cost.

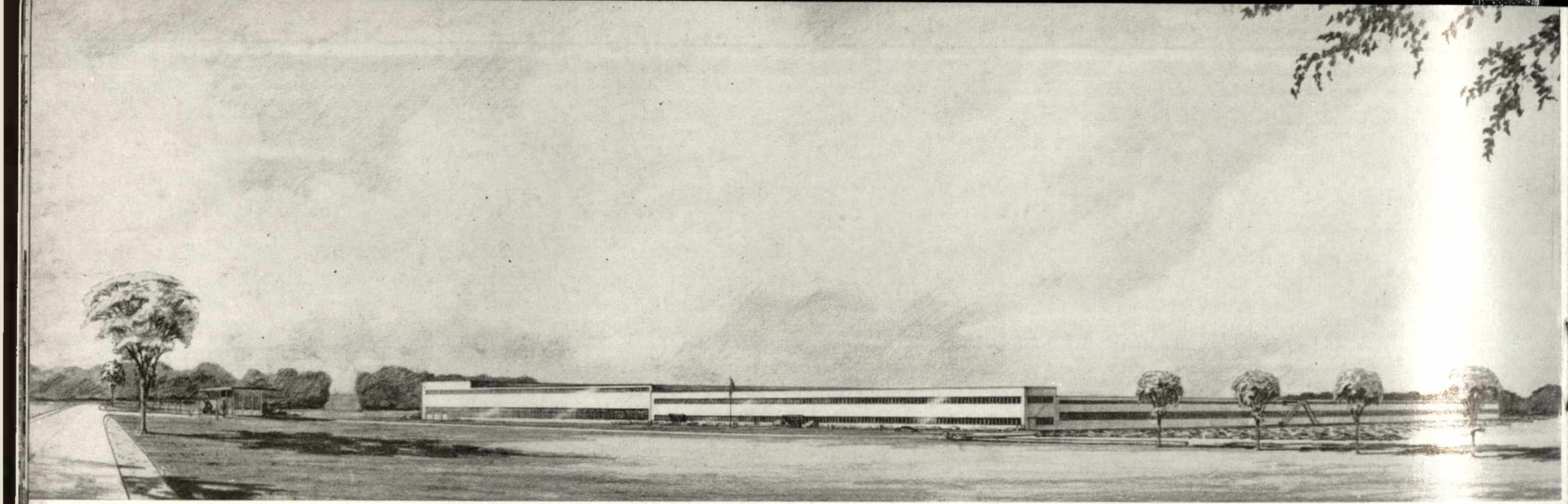
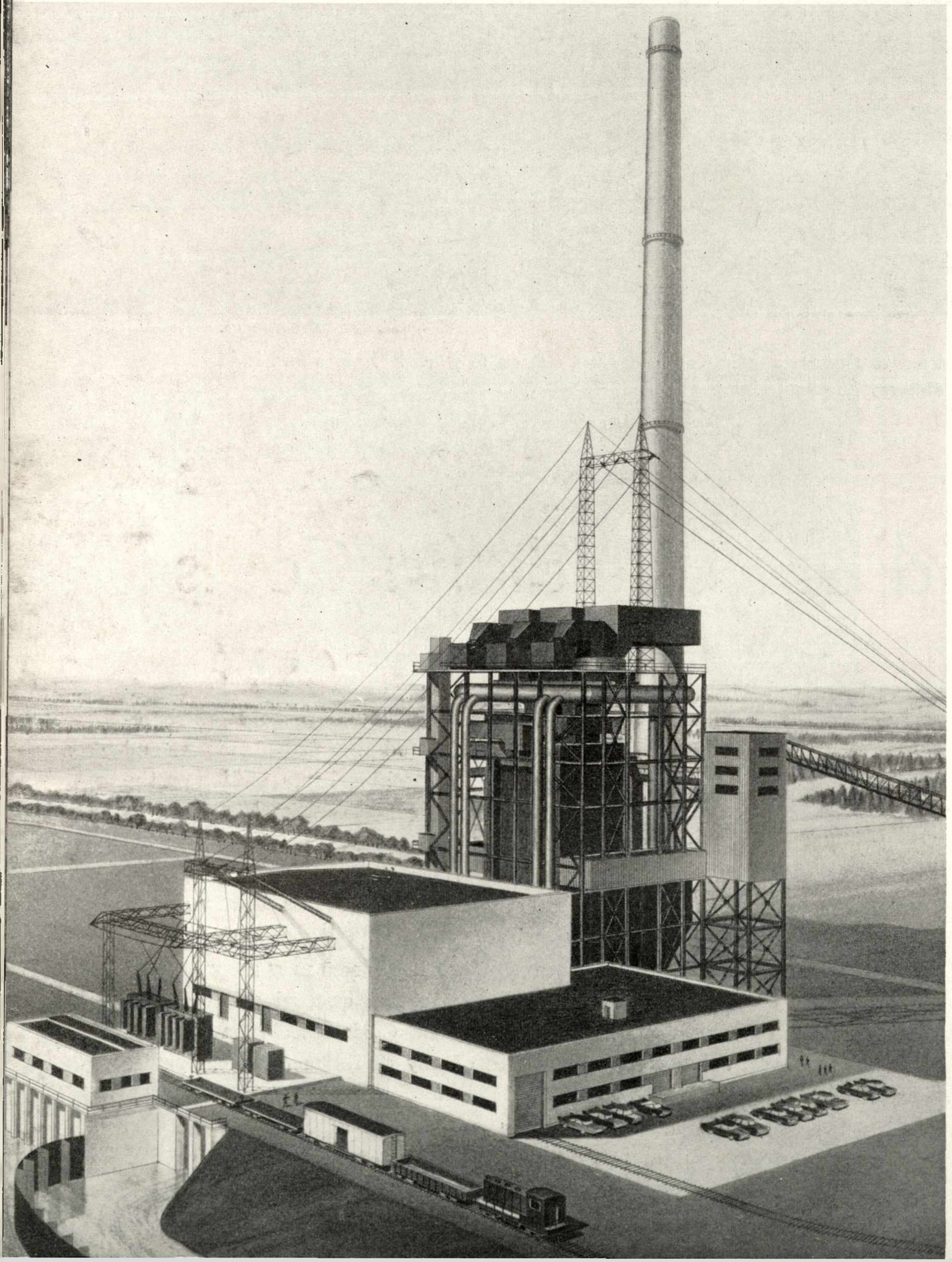


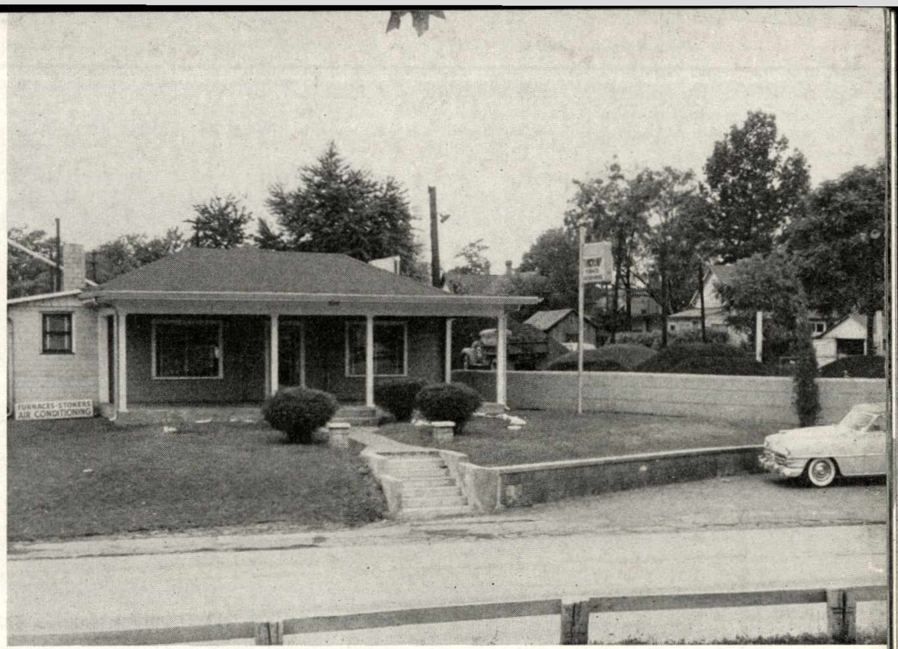
*Photo courtesy General Motors Corporation.*

The Fisher Body Division of General Motors Corporation uses Indiana coal at the recently-completed Marion plant.



The world's largest steam-electric generating unit—450,000 kilowatts—is being installed in the Indiana & Michigan Electric Company's new Breed Station on the Wabash River south of Terre Haute. Indiana coal at the rate of 1,300,000 tons annually will be supplied over six miles of privately-owned railroad connecting the plant with a newly-developed underground mine.

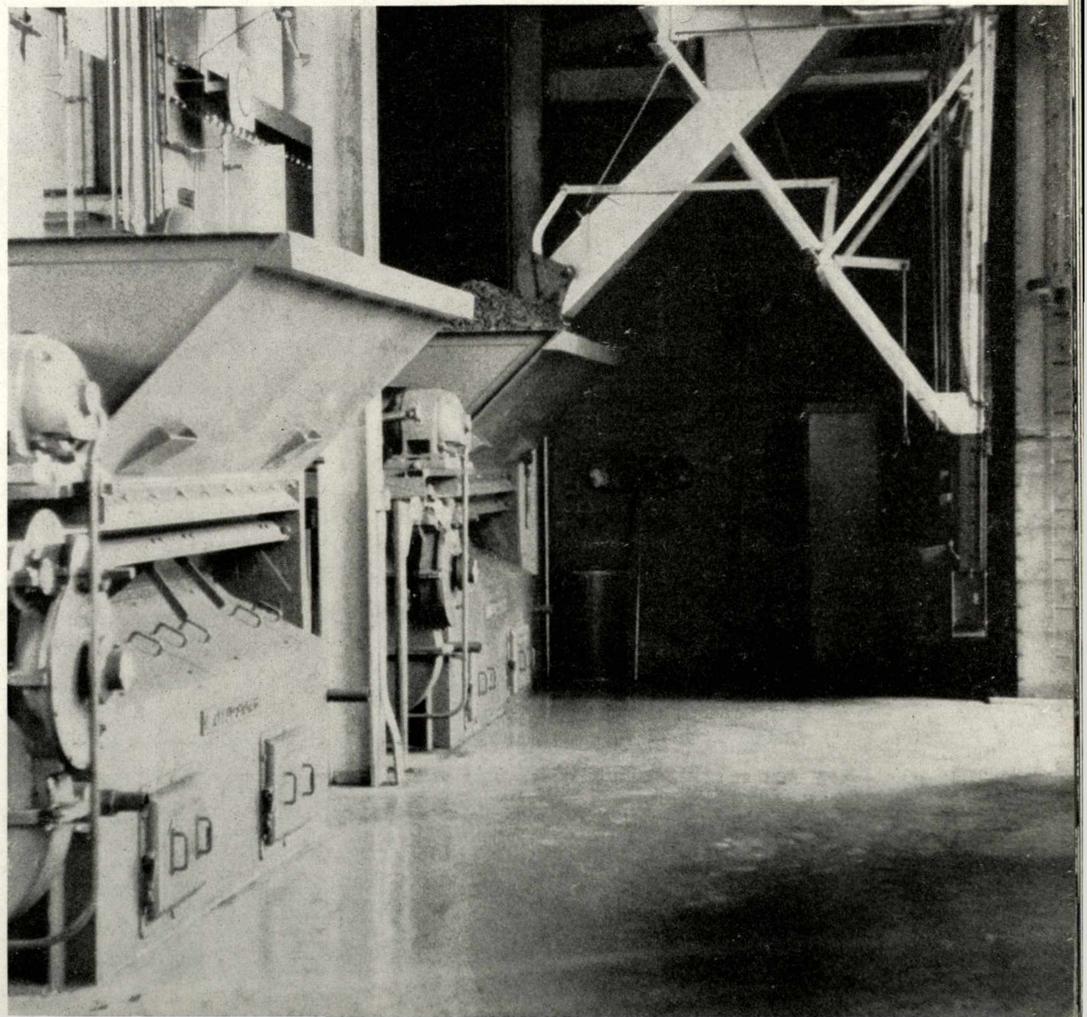
*Photo courtesy Indiana & Michigan Electric Co.*



This well-equipped retail coal yard supplies Indiana coals to homes, schools, commercial plants and small industries not equipped or located to receive direct carload shipments.

The recent conversion of this heating plant from fuel oil to Indiana coal is saving Indiana taxpayers $30,000 annually at one of the state institutions.

Using Indiana coal exclusively, this modern, coal-fired boiler installation in one of the state's colleges is automatic, clean, efficient and economical.

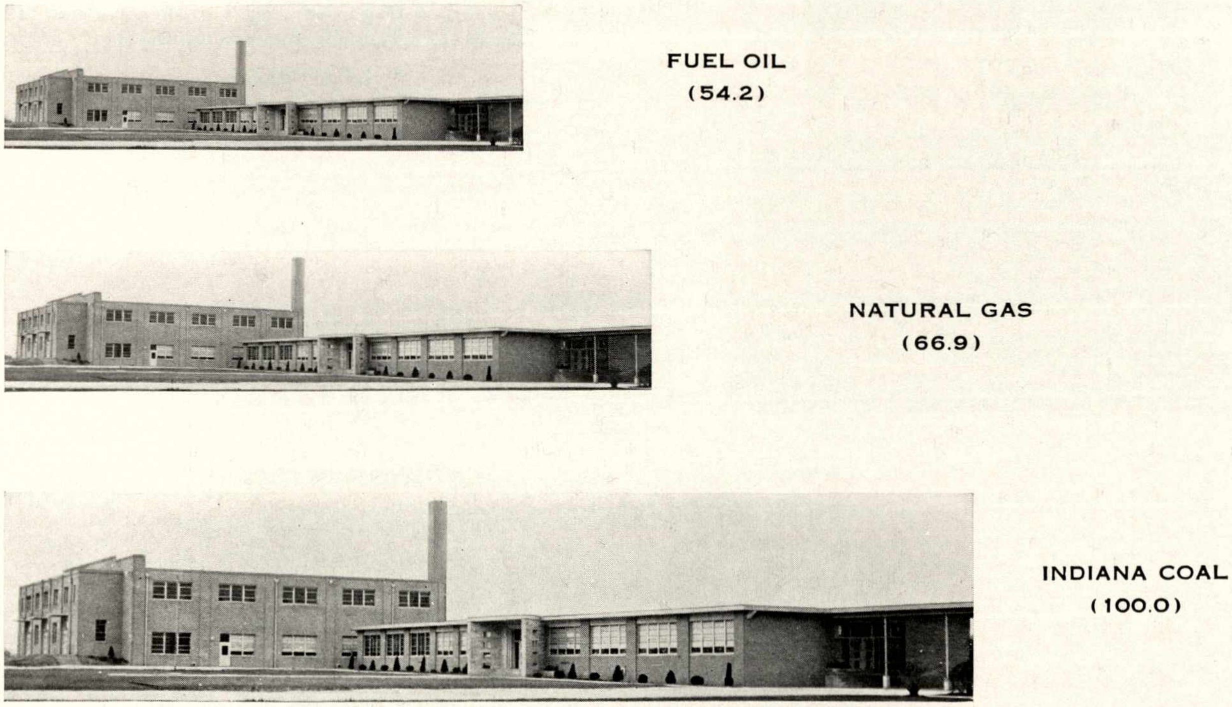


# COAL - The Economical Fuel

The comparative value of different fuels cannot be measured in terms of dollars and cents per ton, gallon, or cubic foot. The fuel buyer is not concerned with such quantities as tons, gallons and cubic feet but rather with the amount of heat actually purchased by each fuel dollar. Applying the yardstick of "heat value per unit of cost", the economy of coal is unequalled by any other fuel. In the example above, fuel oil, natural gas and Indiana coal are compared on the basis of the amount of usable heat furnished by each of the three fuels per unit of cost. Using Indiana coal, supplying 100 units of heat as the base, natural gas can supply 66.9 units and fuel oil only 54.2 units of heat for each fuel dollar. The chart is based upon an actual fuel cost survey made in a typical Central Indiana community. Comparative delivered prices quoted for a one year fuel supply at the time of the survey were $12,040 for fuel oil, $9,100 for natural gas, without assurance of continuous supply, and $6,050 for Indiana coal.

HEAT UNITS PURCHASED BY THE FUEL DOLLAR

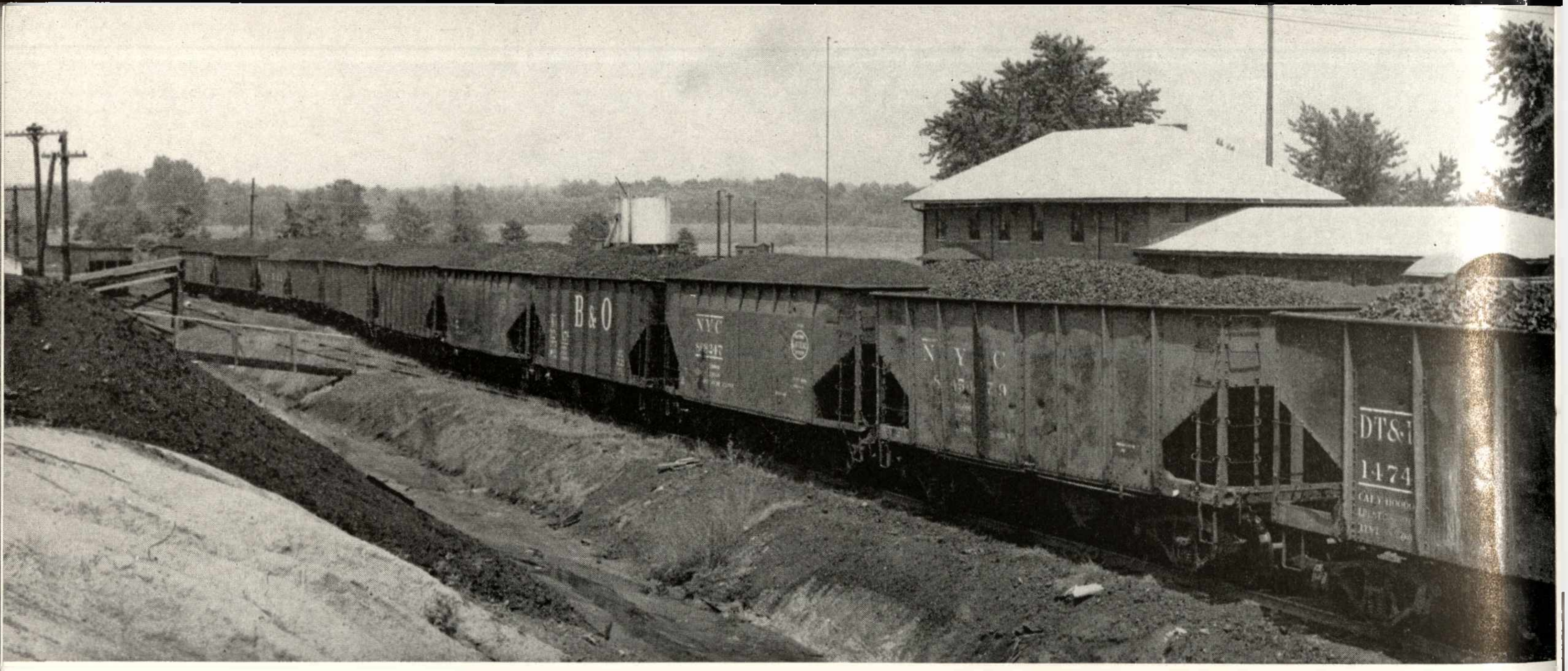
(A COMPARISON OF INDIANA COAL, FUEL OIL AND NATURAL GAS)



In Indiana, as in most of the United States, fuel buyers depend upon coal to provide heat and energy at the lowest possible cost. Not only is coal far less expensive than any other fuel, it is also completely safe and dependable. Coal is readily available, easily transported, and simply stored in quantities sufficient to meet any emergency condition. Properly designed coal-fired plants are completely automatic and burn coal cleanly and efficiently. Annual fuel costs in such plants are often as much as 50 or 60% lower than in similar plants using natural gas or fuel oil. A thorough and careful survey, establishing current availability, delivered cost, future reserves, and probable price trends of different fuels should always precede the selection of equipment for new or modernized heating and power plants. In making such surveys the services of the Indiana Coal Association are available, without cost or obligation, to plant engineers, purchasing agents, architects, consulting engineers, public institutions, and others charged with the responsibility of selecting fuel and fuel-burning equipment.

# INDIANA COAL SALES DIRECTORY

| SALES AGENTS | PRODUCERS |
|---|---|
| Bledsoe, Walter & Co.<br>Merchants Bank Building<br>Terre Haute, Indiana | S. A. Coal Corporation<br>Shasta Coal Corporation<br>Snow Hill Coal Corporation<br>Viking Coal Corporation |
| Central Fuel Corporation<br>7450 Sheridan Road<br>Chicago 26, Illinois | Lone Star Coal Company |
| Deep Vein Coal Company<br>111 North Seventh St.<br>Terre Haute, Indiana | Ingle Coal Corporation<br>Princeton Mining Company |
| Enos Coal Mining Co., The<br>1405 Merchants Bank Building<br>Indianapolis 4, Indiana | Enos Coal Mining Co., The<br>Enoco Collieries, Inc. |
| G & F Corporation<br>Hawkins Building<br>Brazil, Indiana | G & F Corporation |
| Inter-State Coal Co., Inc.<br>909 Electric Building<br>Indianapolis 4, Indiana | Blackfoot Coal & Land Corporation |
| Maumee Collieries Co., The<br>444 South Sixth Street<br>Terre Haute, Indiana | Maumee Collieries Co., The |
| Morgan Coal Company<br>2850 North Meridian St.<br>Indianapolis 8, Indiana | Morgan Coal Company |
| Republic Coal & Coke Company<br>8 South Michigan Avenue<br>Chicago 3, Illinois | Ayrshire Collieries Corp.<br>Boonville Collieries Corp.<br>Fairview Collieries Corp. |
| Peabody-Southern Coal Co.<br>Prudential Plaza<br>Chicago 1, Illinois | Lynnville Coal Company<br>Sunlight Coal Company<br>Tecumseh Coal Corporation<br>Victoria Coal Corporation |
| Sterling-Midland Coal Company<br>8 South Michigan Avenue<br>Chicago 3, Illinois | Sherwood-Templeton Coal Co. |



Rail — Most of Indiana's coal is hauled by the railroads. Indiana mines are served by the Pennsylvania, New York Central, Chicago and Eastern Illinois, the Monon, Baltimore and Ohio, the Milwaukee, the Southern, the Illinois Central and The Algers, Winslow and Western.

# Transportation

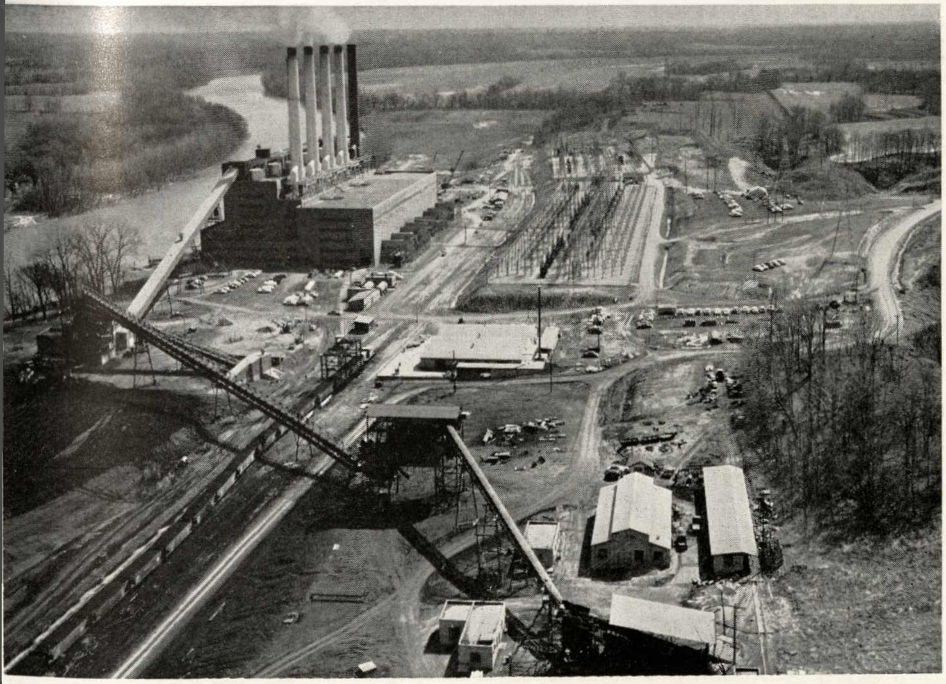
Although railroads haul the largest part of the tonnage, millions of tons of Indiana coal move to market by other forms of transportation. Great Lakes markets are served by a combination of rail and water transportation. Barge movement on the Ohio and other rivers is continually increasing, and trucks hauling directly from mines or retail coal yards to consumers are carrying more tonnage each year. Several million tons of Indiana coal are transported annually directly from mine to plant by conveyor belts. Transportation of coal in pipe lines as a slurry, or coal-water mixture, has been proven practical and may assume an important role in the future movement of coal.

River — Indiana coal loaded in Ohio river barges. A growing percentage of Indiana coal moves on the Ohio river and connecting waterways. Average capacity of river barges is 1400 tons of coal. A single tow may consist of as many as 16 barges.

Trucks — Many consumers receive coal directly from Indiana mines or from coal dealers in trucks of from 5 to 20-ton capacity.

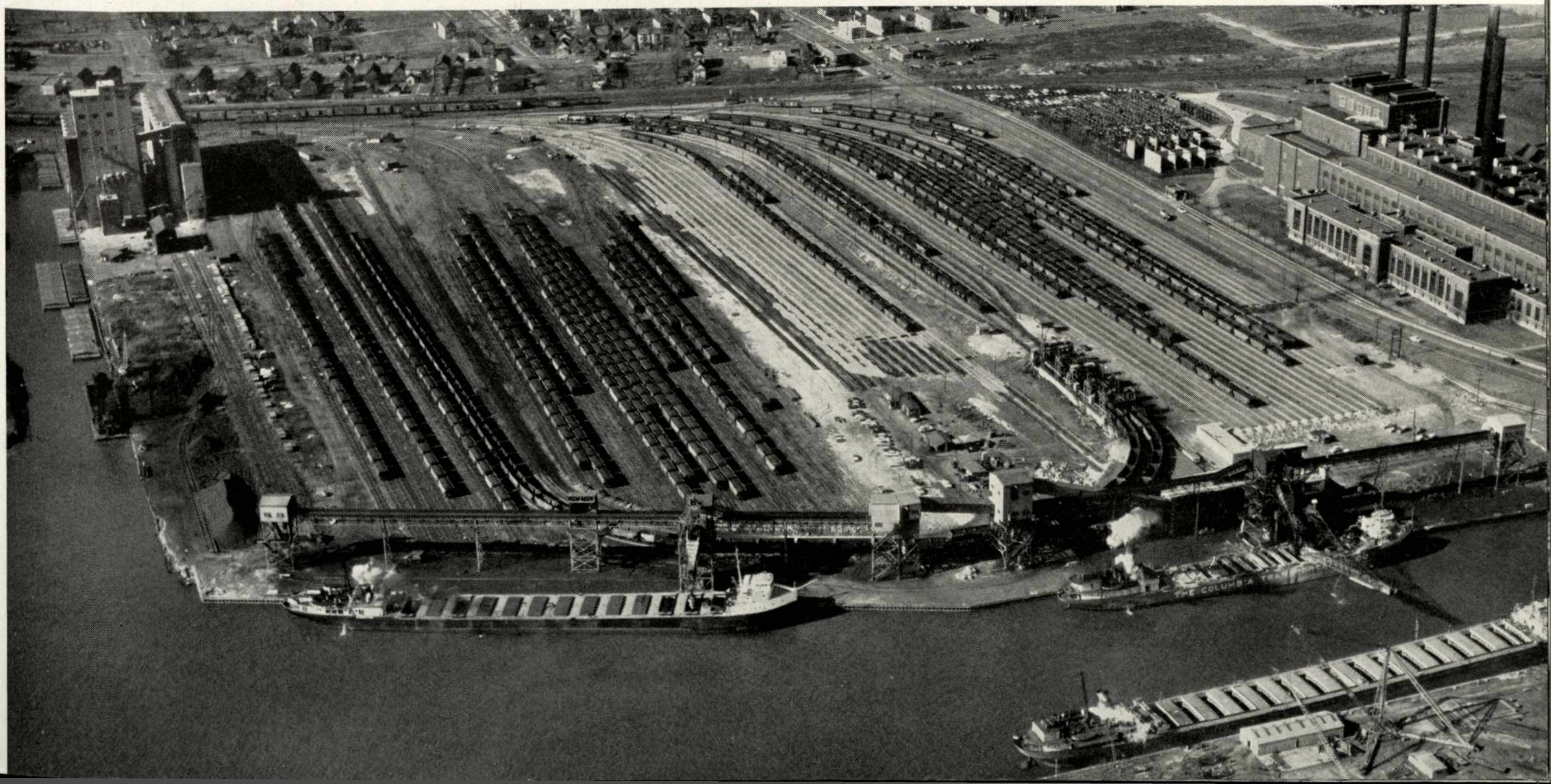
Conveyor Transport — This electric generating station is supplied with coal directly from the mine.

*Photo Courtesy Public Service Co. of Indiana.*



Rail-to-Water — The Rail-to-Water Transfer Corporation located on the Calumet River near Hammond, Indiana. Through this installation, capable of handling 1,400 carloads daily, over 6,000,000 tons of Indiana and other midwestern coals are shipped annually to consumers throughout the Great Lakes region. This facility has a storage capacity of 2,100 cars and with its two movable loading towers can load two ships at the same time. It is owned by 29 leading coal companies with mines located in Indiana, Illinois and Western Kentucky.

*Photo Courtesy Rail-to-Water Transfer Corp.*



Crews of men, residents of the area and trained by the mine operators, plant seedlings on spoil banks. For several years after planting, the seedlings, only a few inches tall, are invisible to the untrained eye then appear almost over night like soldiers on parade.

# Reclamation of Coal Lands

The first organized effort to restore strip-mined lands to productive use began in Indiana in 1926 and the program has progressed each year. The Indiana mining industry is the only one that has assisted in the passage of state laws to require the reclamation of mined areas. The Indiana coal industry was the first to employ a full-time technical man to direct the reclamation program.

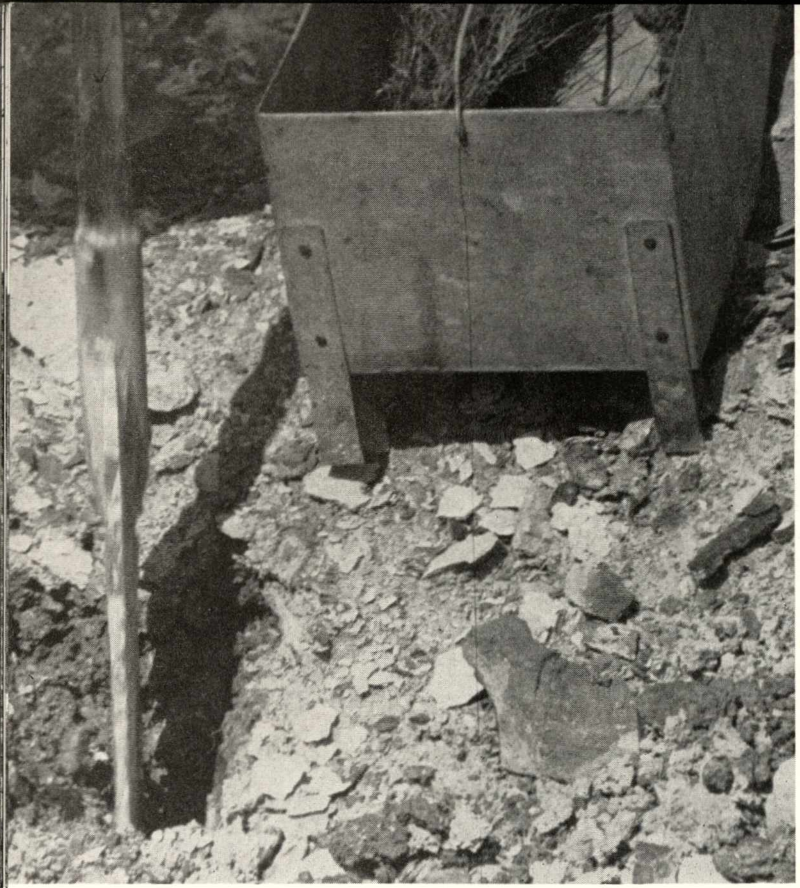
The strip mining industry in Indiana mines an average of about 2,000 acres annually. All of the land is reclaimed by the method for which the land is best suited. This depends on the type of materials in the spoil banks. Some areas contain very little rock or shale and are high in lime, phosphorus and potash. These areas are graded down smoothly so they can be used for cultivated crops. Other similar areas are less fully graded and are sown for pasture land. Trees are planted on highly acid spoil banks and those composed largely of rock and shale. Since 1926 Indiana strip mine operators have planted over 40,000,000 seedlings with between 2½ and 3 million being set out in a single season.

On newly mined and barren spoil banks, the survival of planted seedlings is good, often exceeding 80 per cent. Game abounds in the areas. Unplanted openings combined with the unmined edges provide feeding areas for many song and game birds. The trees furnish them cover and protection from their natural enemies. Coon are abundant in the rock banks and around the many lakes that provide them with much of their food. A large herd of deer made its home in the extreme southwestern part of the State until two consecutive open seasons permitted hunters almost to exterminate it.

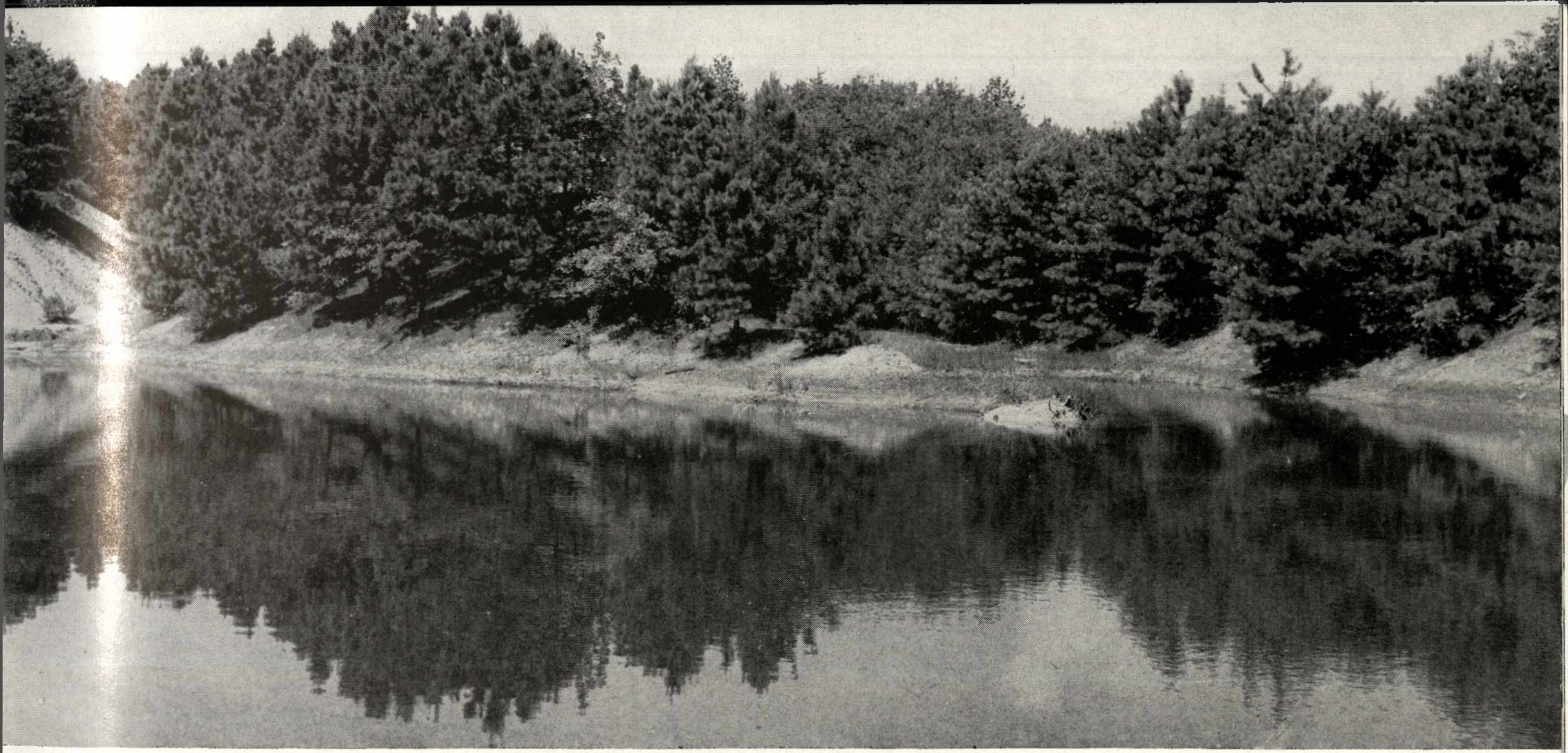
The constant lowering of the underground water tables, not only in Indiana but throughout the entire nation, is a problem that is fast becoming one of the country's most serious. Creating small lakes and reforesting mined areas reduce run-off, conserve water and provide a solution to this problem.

There is a great deal of difference in the character of the spoil banks remaining after completion of strip mining operations. Some areas of good spoil can be graded and used for pasture or farm crops. Other areas, suitable only for trees, are more productive if left in their rough condition. Experience has proven that grading the spoil banks after mining can often be harmful. Erosion rears its ugly head. Seedlings planted on graded areas are often either washed out or buried by eroded material.

Row after row of planted trees grow on strip-mined lands. These ranks of trees represent future crops of posts, poles, pulpwood and lumber.

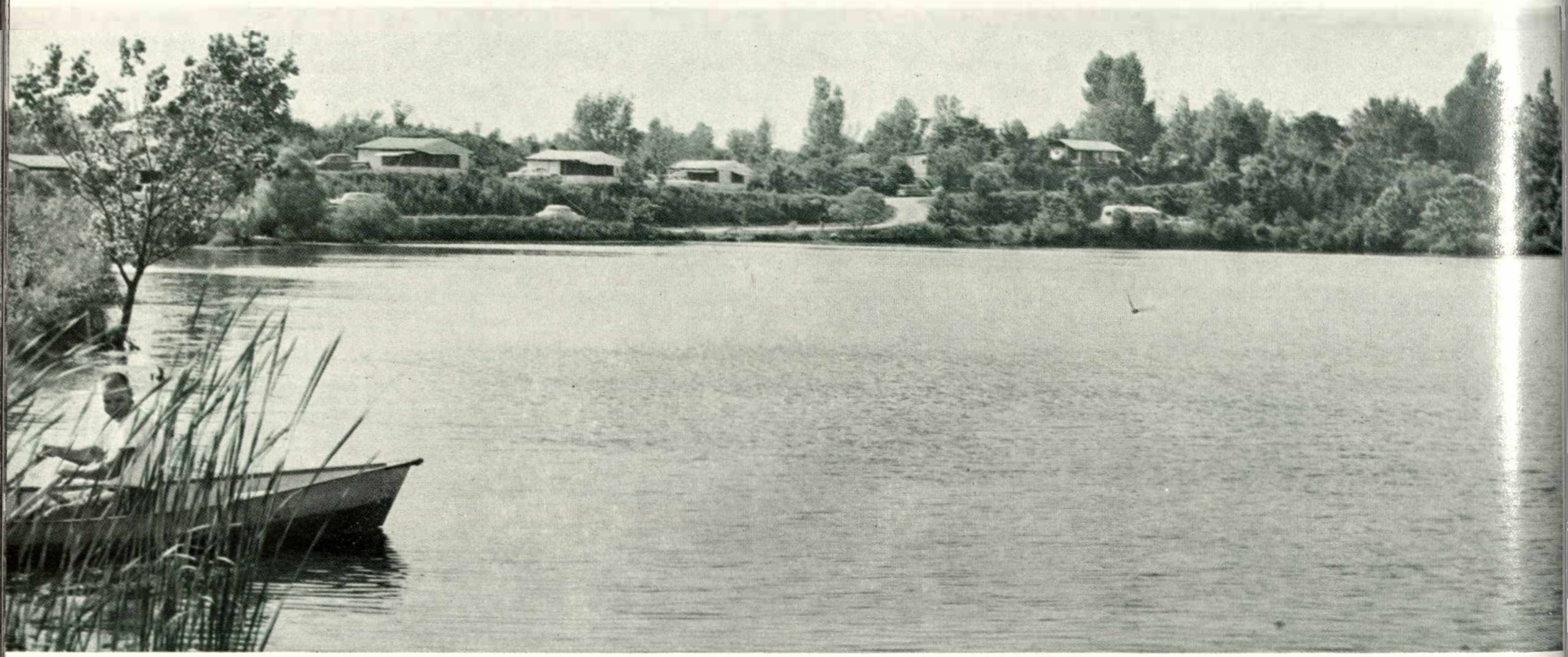


Under the Indiana coal industry's reforestation program, many varieties of pines and hardwoods are planted each year on barren spoil banks. The tiny seedlings are purchased by the mine operators from State Nurseries at the same prices paid by individual buyers. Using equipment designed specifically for the planting conditions, each member of a planting crew can set out from 600 to 1000 seedlings a day during the Spring planting season. During the past thirty years Indiana's mine operators have planted over 40,000,000 trees. Despite the desolate appearance of the spoil, survival is high. The growth rate of the seedlings often exceeds that of the same species planted on unmined lands.

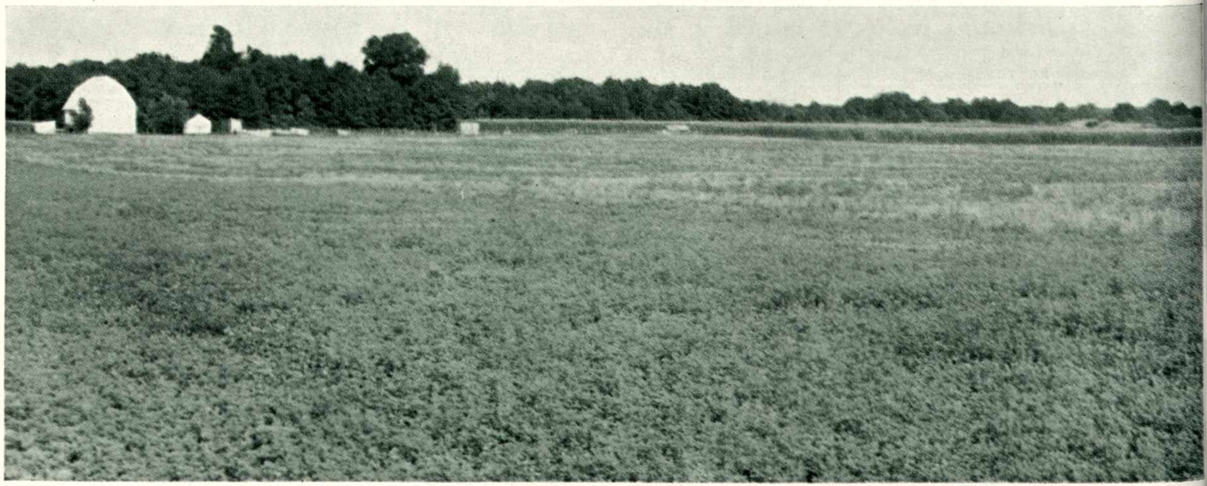


This area in Greene County, completely clothed with red, white and jack pines, was bare spoil ten years ago. Mirrored in one of the crystal clear lakes, this man-made forest not only enhances the appearance of a formerly unproductive area, but now promises substantial economic return to the community and the State of Indiana.

Timber harvested from reforested spoil banks. Each acre of this 20-year old pine produced 550 fence posts and 31 large poles. These posts, if set 12 feet apart, would support 1¼ miles of fence and the poles would carry over ½ mile of telephone line.

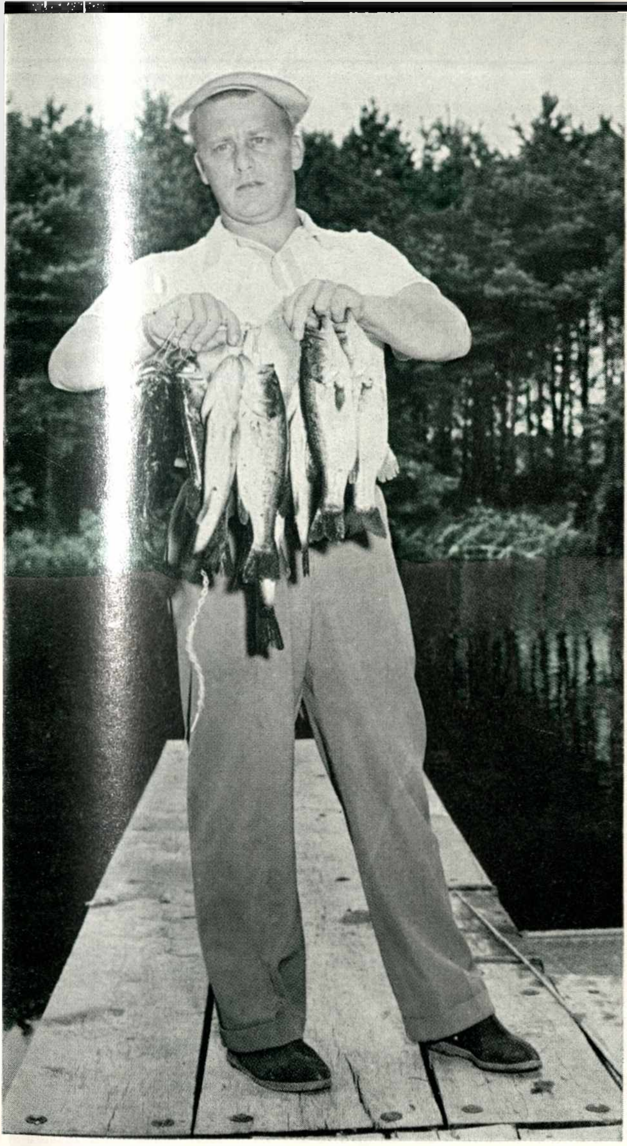


Strip mine lake bordered with summer homes on reclaimed land near Terre Haute.



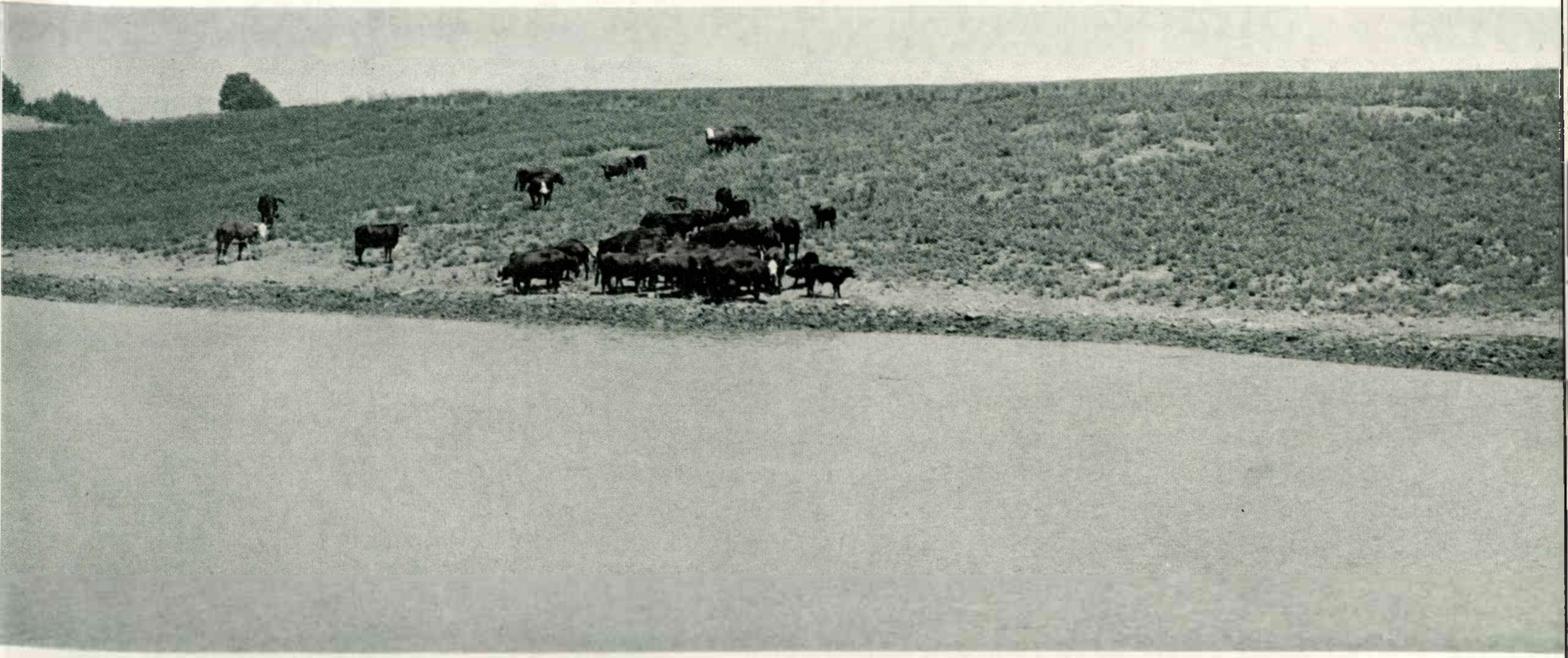
Alfalfa, wheat and corn growing in Clay County on graded spoil banks rich in lime, phosphate, and potash.

A typical Sunday crowd at a commercial lake and summer resort developed on reclaimed mined land in Clay County.

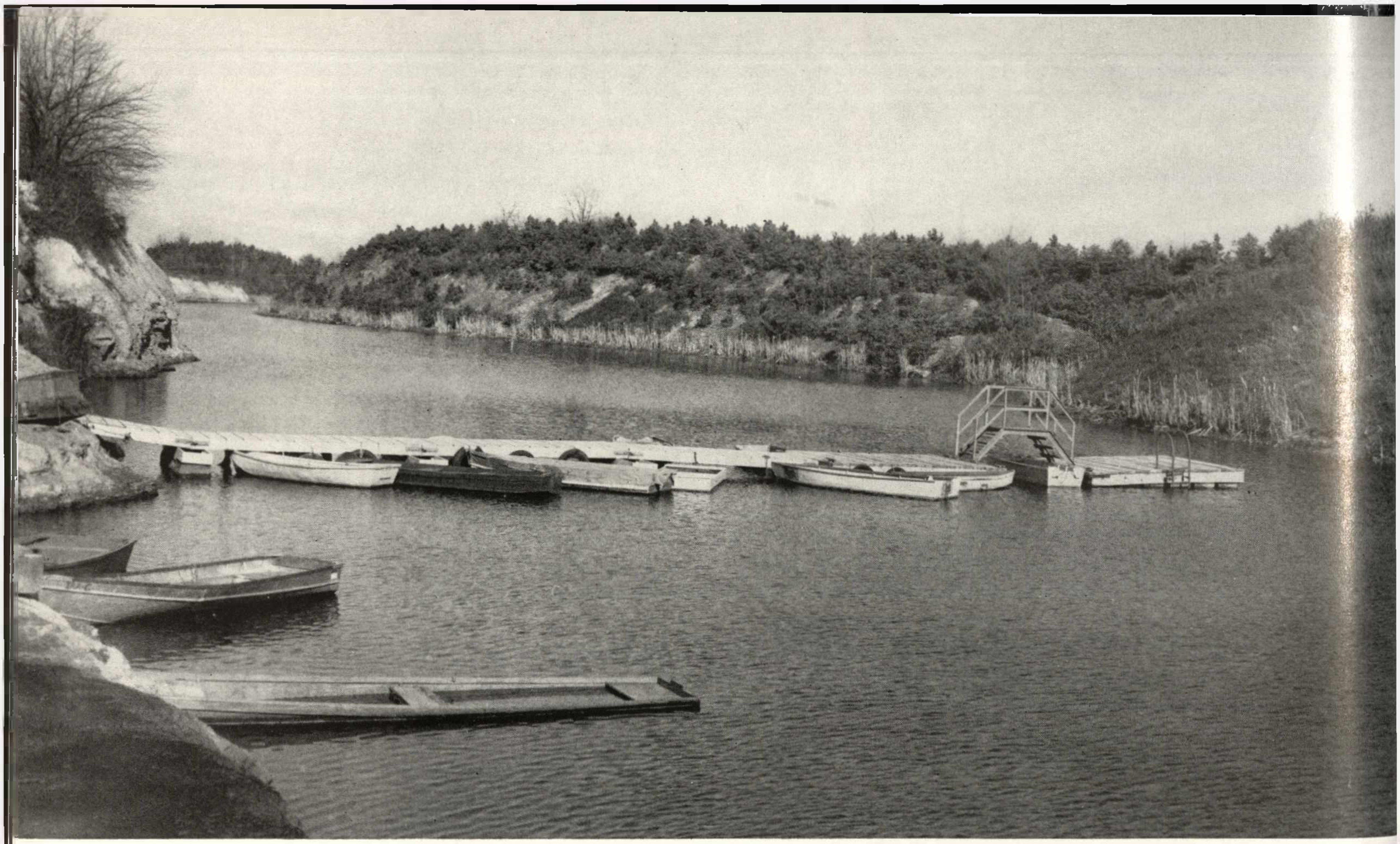


A well-established stand of evergreens. Planted in 1927, 1928 and 1929, these trees are now as large as 12 inches in diameter. The small trees in the foreground are seedlings from the larger trees.

Fishing as well as boating is popular on the man-made lakes of the mined areas. Thousands of Hoosier disciples of Isaak Walton spend pleasant leisure hours on more than 5,000 acres of these lakes. These bass, caught in a strip-mine lake, are ample proof.



Sleek cattle on a graded spoil bank pasture. This 120 acre field supported 80 head of cattle for 180 days during a normal grazing season.



Strip pit lakes once too acid to support fish life are now excellent fishing and recreation areas. One successful way to eliminate acidity in lakes such as this is to raise the water level. The higher water level covers the acid-forming materials preventing the oxidation which normally occurs when such materials are left exposed to the air.

# Control of Stream Pollution

In common with many industries, early coal-mining operations often utilized rivers and streams to dispose of waste materials. Today every effort is made to prevent mine refuse from reaching streams and to avoid disposing of it in any way which might result in stream pollution.

The potential pollutants resulting from the mining and preparation of coal are acid and suspended solids. Acid is formed by nature from the sulphur in abandoned mine workings and in the refuse cleaned from the coal. Suspended solids are fine particles of clay, rock, shale and other impurities removed from the coal in the washing process. Confinement and controlled discharge of acid mine waters and the application of closed-circuit cleaning processes have resulted in a noticeably large decrease in stream pollution by the coal industry.

Continued progress in the abatement of stream pollution is assured by the cooperative research programs of the coal industry, public agencies and other industries concerned with the problem.

Each mining operation presents a different problem in stream pollution abatement. Impurities vary in composition and quantity both in different veins of coal and often within the same vein in different parts of the State. At some strip mines refuse is returned to mined-out pits. Although this practice eliminates a potential lake, it effectively prevents acid water from reaching rivers and streams. Other mines construct large dam-like earth fills across valleys. All refuse is placed behind these dams and the natural run-off is diverted to prevent contamination of the watershed.

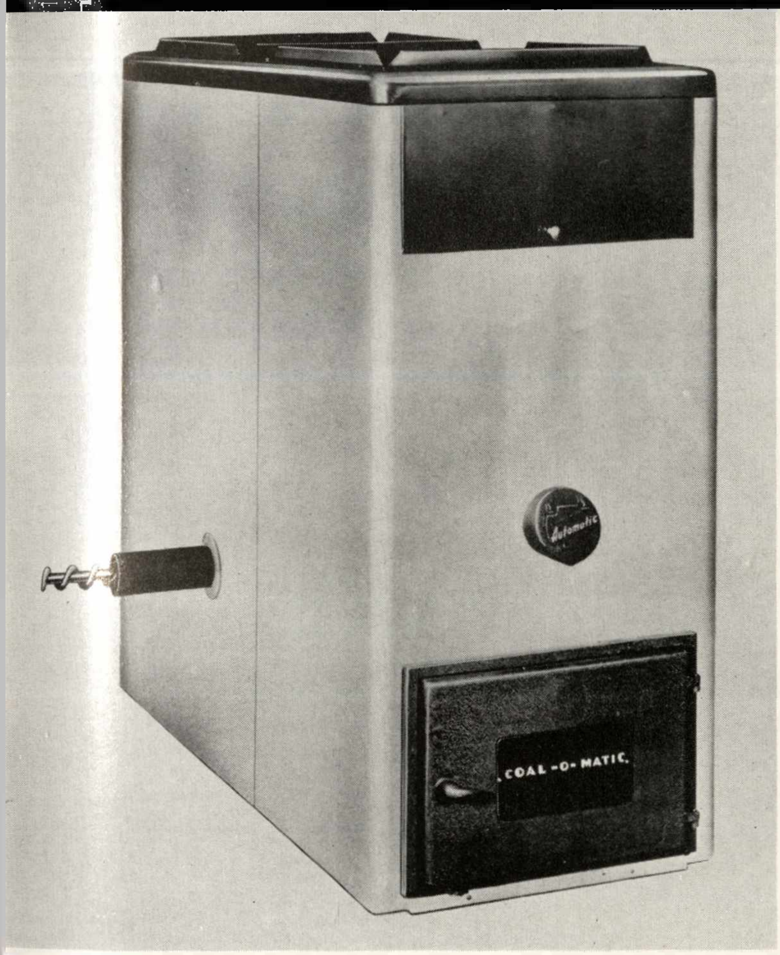
Joint action of the Stream Pollution Control Board and the mine operators is directed toward the solution of each individual problem. Indiana mine operators cooperate fully with the Stream Pollution Control Board of the State Board of Health. Field inspections are made regularly by representatives of the mines and the Control Board to evaluate the effectiveness of control work and to determine what additional measures, if any, should be undertaken.

Strip-mine lakes, like the one shown here, are stocked with fish purchased from commercial hatcheries as a part of the Indiana coal industry's conservation program.

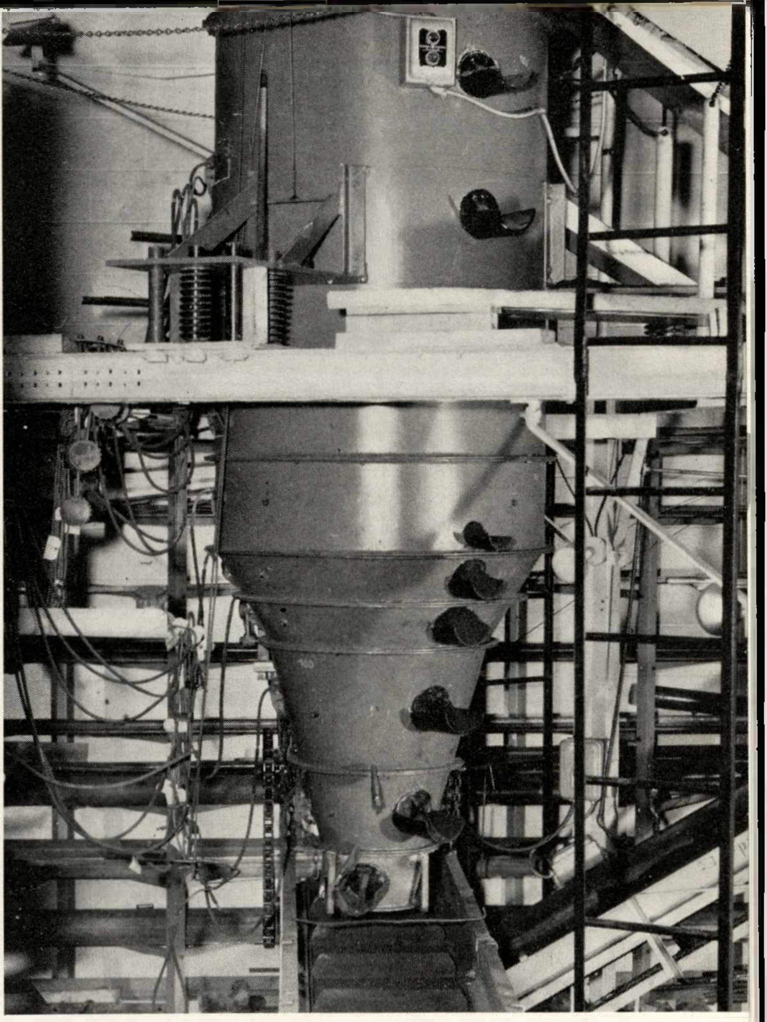
Columbus, Ohio, laboratory and offices of Bituminous Coal Research, Inc. This organization is dedicated to the most effective use of the nation's greatest fuel resource . . . . bituminous coal.

# Research

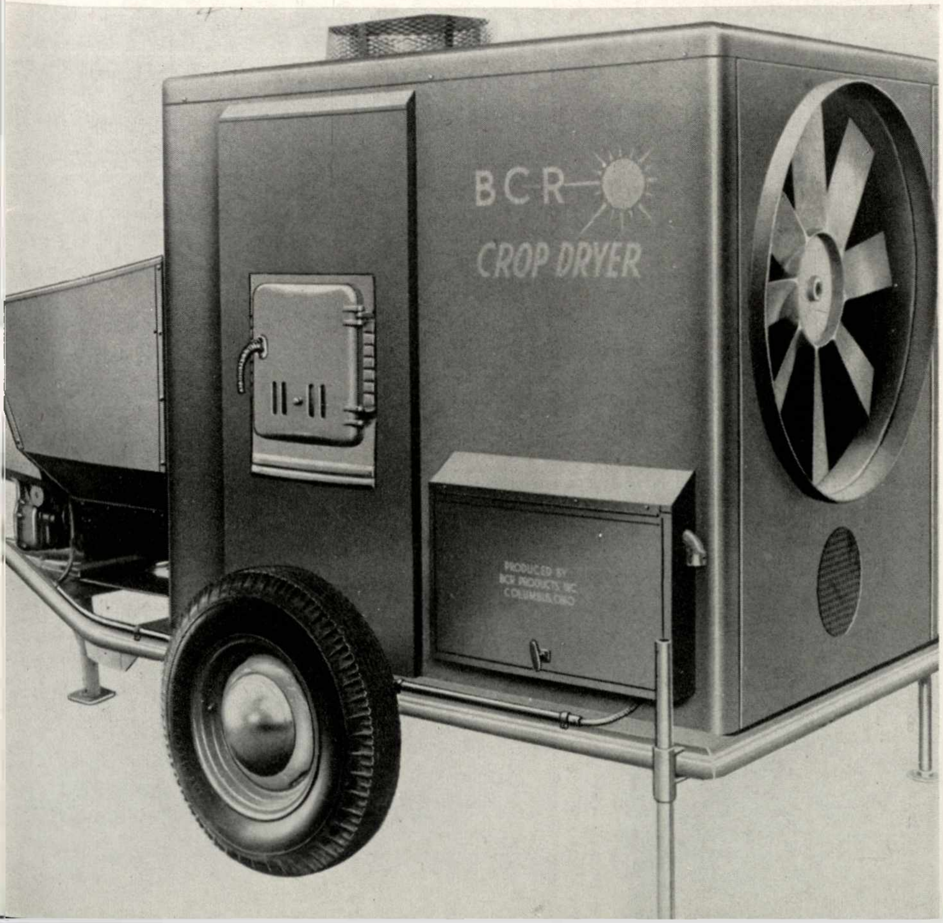
Research, the quest for better, more economical methods and equipment, is the lifeblood of the coal industry. Bituminous Coal Research, Inc., with offices and laboratories in Pittsburgh, Pennsylvania, and Columbus, Ohio, is the research arm of the bituminous coal industry. BCR is an independent non-profit organization sponsored by operators of bituminous coal mines, coal sales agencies, the railroads, equipment manufacturers and coal users. In addition to the work done by BCR, coal research programs are also conducted by universities, private research laboratories, the U. S. Bureau of Mines and other Federal and State agencies. These research programs have resulted in significant advances in the mining, preparation and utilization of coal as well as in closely related fields such as land reclamation, water conservation and stream pollution abatement. The benefits of the coal industry's extensive research are passed on to the consumer in the form of better products at lower prices, new and improved coal-burning equipment, and more efficient plant operating techniques. Not only has the use of coal as fuel been greatly extended through research, but many new and important non-fuel uses have also been developed. For example, chemical research has made it possible to extract literally thousands of chemical products from coal, ranging from life-saving "wonder drugs" to colorful dyes and high explosives.



The Coal-O-Matic furnace,
manufactured by Dallas Engineers, Inc.,
Trucksville, Pa., combines stoker,
blower, furnace, and ash receptacle in this
attractive unit for home heating.

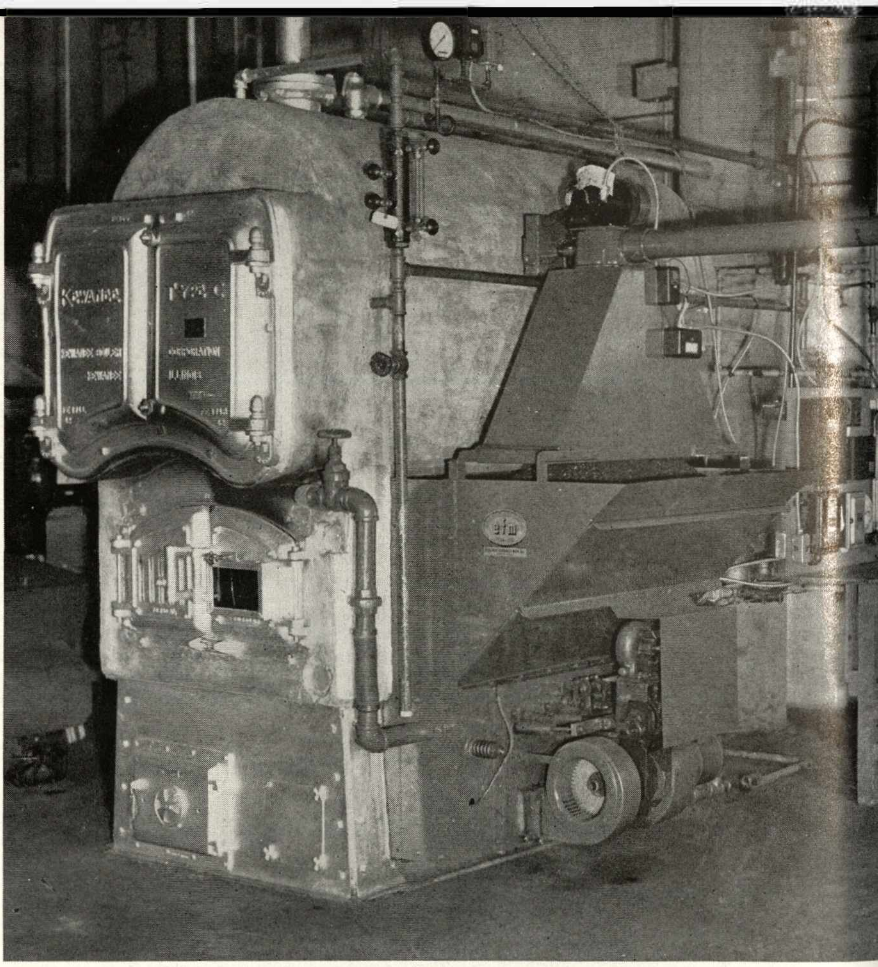


Regardless of size or moisture
content, coal flows uniformly from this
BCR-developed storage system
without stoppage or segregation.

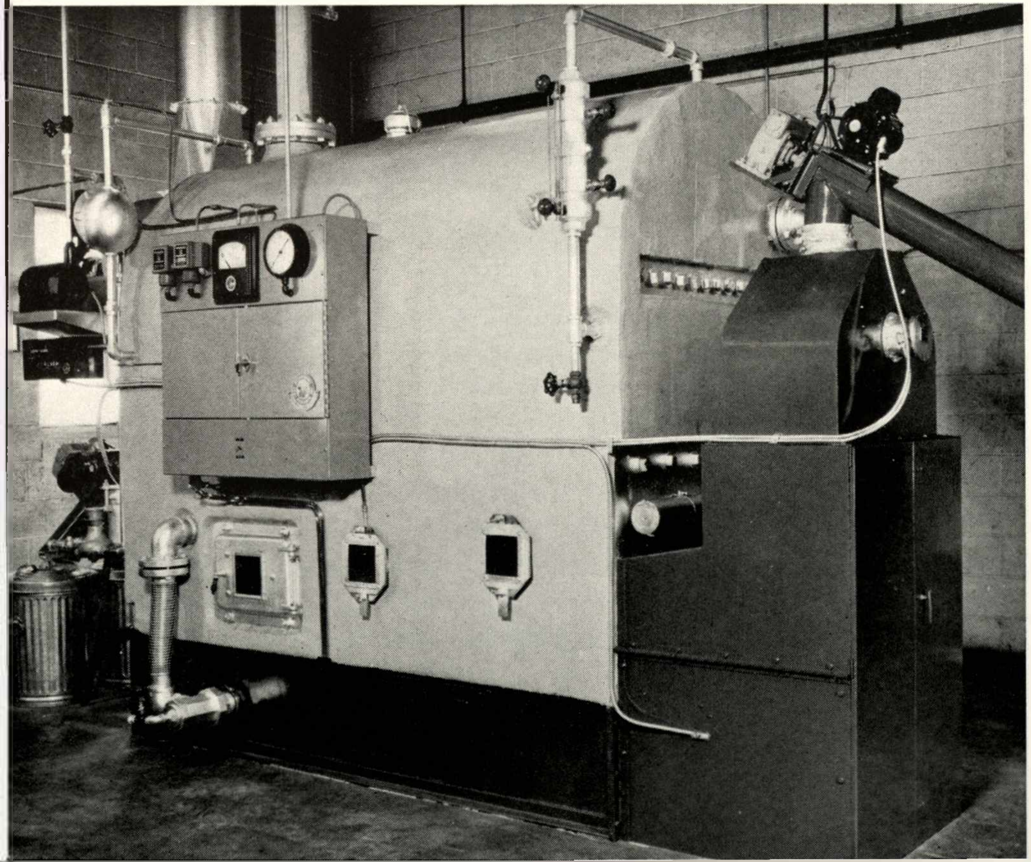


Mobile crop dryer developed by
Bituminous Coal Research, Inc. This
stoker-fired machine has a record
of proven performance for
efficiency and economy
in the drying of agricultural products.

The Fire-Jet Burner, an anthracite stoker converted by BCR to use bituminous coal, is manufactured by the General Machine Company of Emmaus, Pa. Equipped with bin-feed mechanism, ash handling equipment, and control system, the Fire-Jet provides a completely automatic means of burning bituminous coal. Intended for low-pressure application in commercial and small industrial plants, the unit may be installed in new or existing steel boilers of all types. The Fire-Jet is available in a size range of 115 to 325 pounds of coal per hour and greater capacity may be obtained through the use of multiple installations.

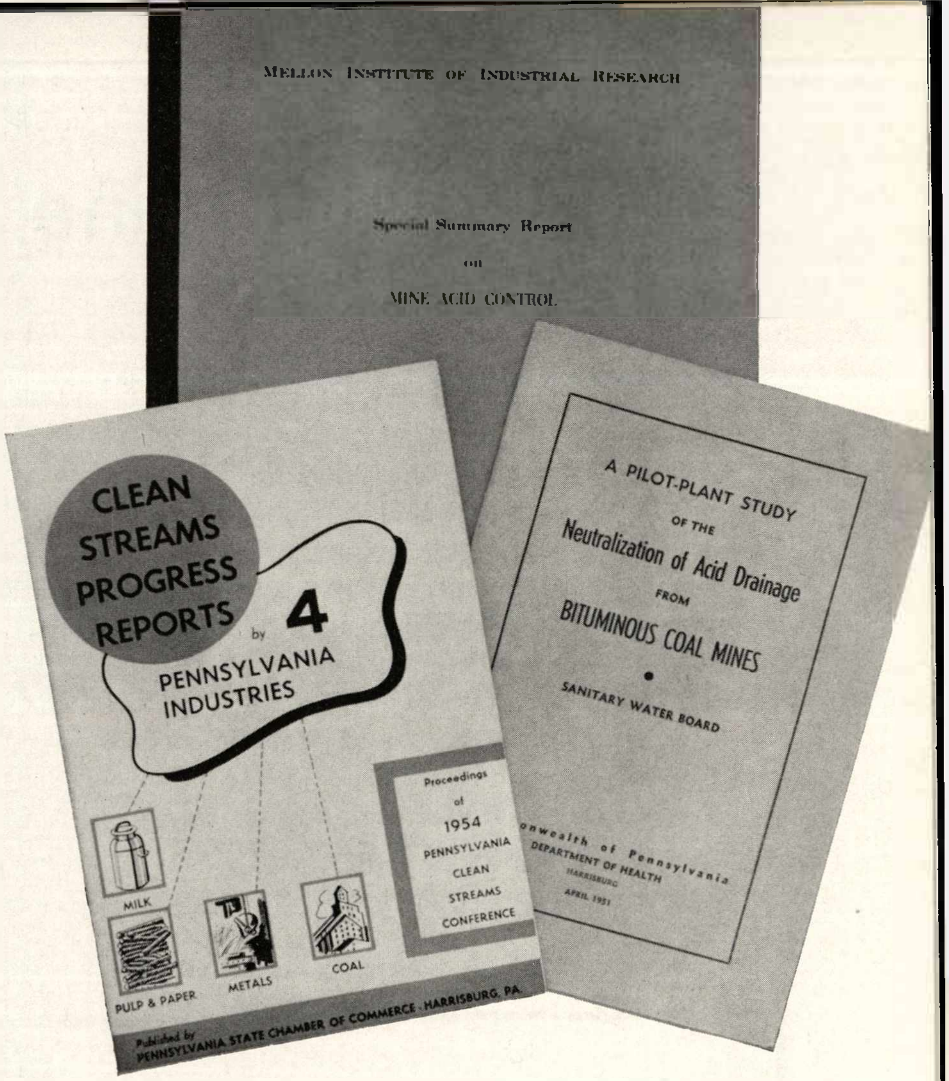


Competitively-priced with respect to equipment designed for other fuels, the coal-burning units shown here are unequalled in economy of operation. With water-cooled grates, automatic coal feed, continuous ash removal, and simple, reliable controls, these units burn coal with no more attention than that required with fluid fuels. Designed to burn a wide range of bituminous coals, both units give exceptional performance with Indiana coals. Complete information on this equipment may be obtained from Bituminous Coal Research, Inc., or the Indiana Coal Association.



Outstanding design features of the BCR Coal-Fired Steam Generator include smokeless operation, continuous ash removal, automatic maintenance of a banked fire, automatic start from banked or idle condition, and rapid, automatic response to load changes. The BCR Steam Generator is a complete package unit including boiler, stoker, coal feeder, ash-removal equipment, controls and all auxiliaries. It is factory-assembled and tested before shipment. The unit is manufactured by the International Boiler Works Company, East Stroudsburg, Pa., and is currently available in sizes from 30 to 300 horsepower.

Much experimental work in using Indiana's strip-mined land for forest, pasture and other agricultural purposes has been done within the state by Purdue University, the State Department of Conservation, the Central States Forest Experiment Station and the Indiana Coal Association. Research projects on stream pollution abatement at Mellon Institute, Johns Hopkins University, Bituminous Coal Research, Inc., and in various State and Federal agencies have resulted in minimizing, and in many cases even eliminating, pollution. The Indiana coal industry is contributing both technical and financial support to such research programs.



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Special Summary Report
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CLEAN STREAMS PROGRESS REPORTS by 4 PENNSYLVANIA INDUSTRIES

MILK
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COAL

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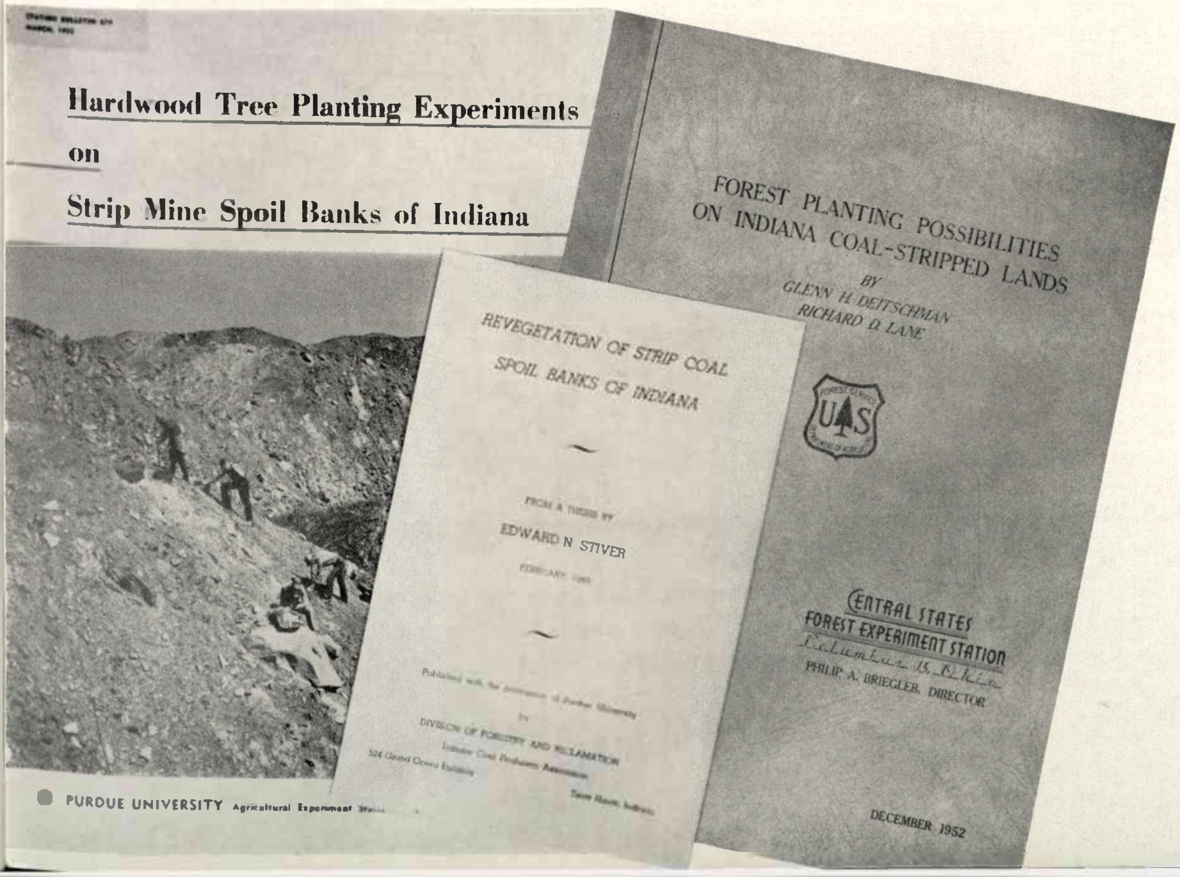
A PILOT-PLANT STUDY
OF THE
Neutralization of Acid Drainage
FROM
BITUMINOUS COAL MINES
•
SANITARY WATER BOARD

onwealth of Pennsylvania
DEPARTMENT OF HEALTH
HARRISBURG
APRIL 1951

Progress reports covering results of stream pollution research keep mine operators and pollution control agencies abreast of new developments and improved abatement techniques.



Hardwood Tree Planting Experiments
on
Strip Mine Spoil Banks of Indiana

PURDUE UNIVERSITY Agricultural Experiment Station

FOREST PLANTING POSSIBILITIES
ON INDIANA COAL-STRIPPED LANDS
BY
GLENN H. DEITSCHMAN
RICHARD D. LANE

CENTRAL STATES
FOREST EXPERIMENT STATION
Columbus 15, Ohio
PHILIP A. BRIEGLEB, DIRECTOR

DECEMBER 1952

REVEGETATION OF STRIP COAL
SPOIL BANKS OF INDIANA

FROM A THESIS BY
EDWARD N STIVER

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Indiana Coal Producers Association
524 Grand Opera Building
Terre Haute, Indiana

Publications describing the results of land reclamation research projects have guided the successful restoration of mined areas to profitable uses.

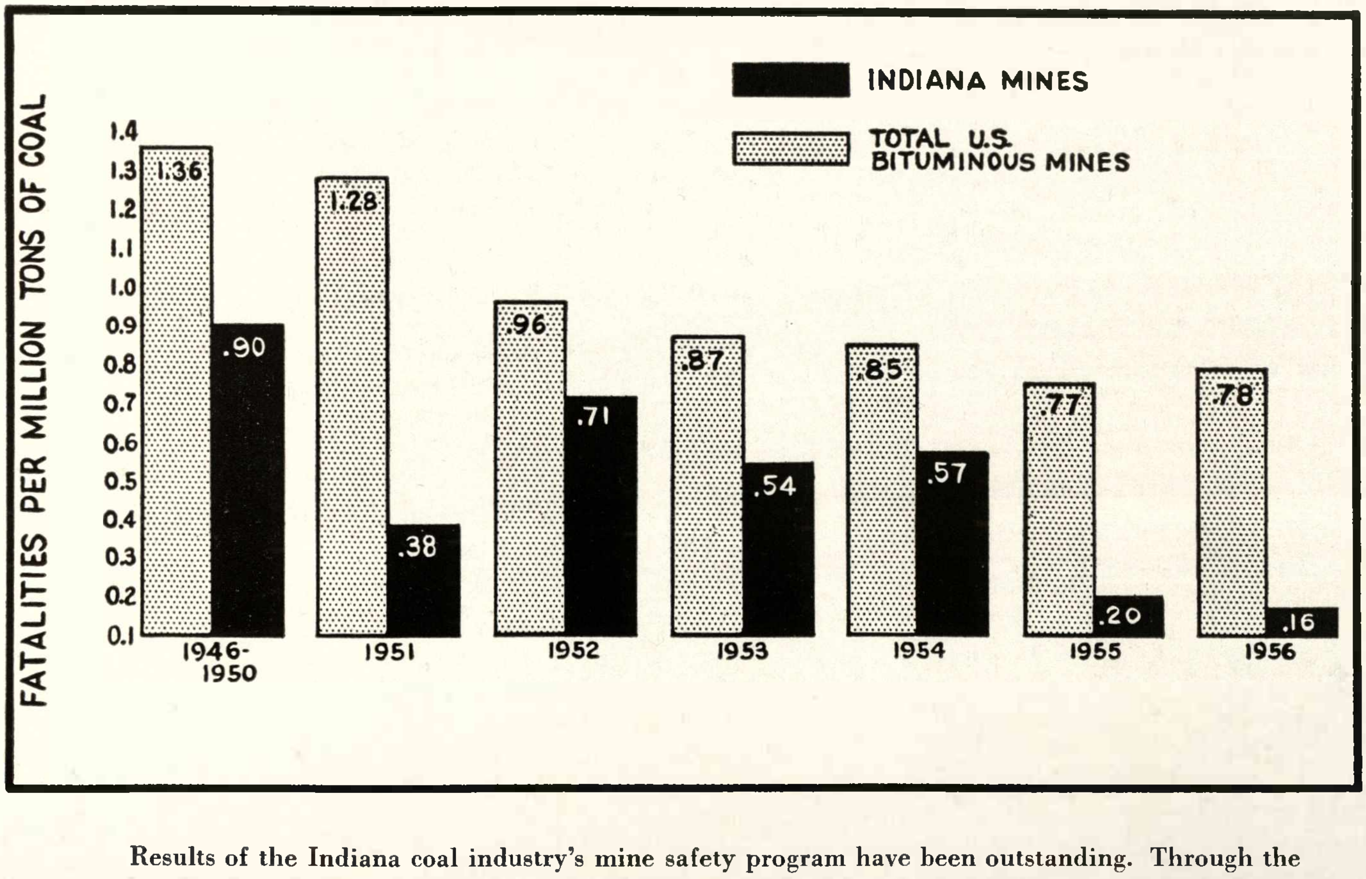
# Coal Mine Safety

Safety is the goal of everyone connected with the coal industry. Particularly is this true of the Indiana coal industry. As it has pioneered in new mining and preparation techniques, so has the Indiana industry led the way in the mine safety drive.

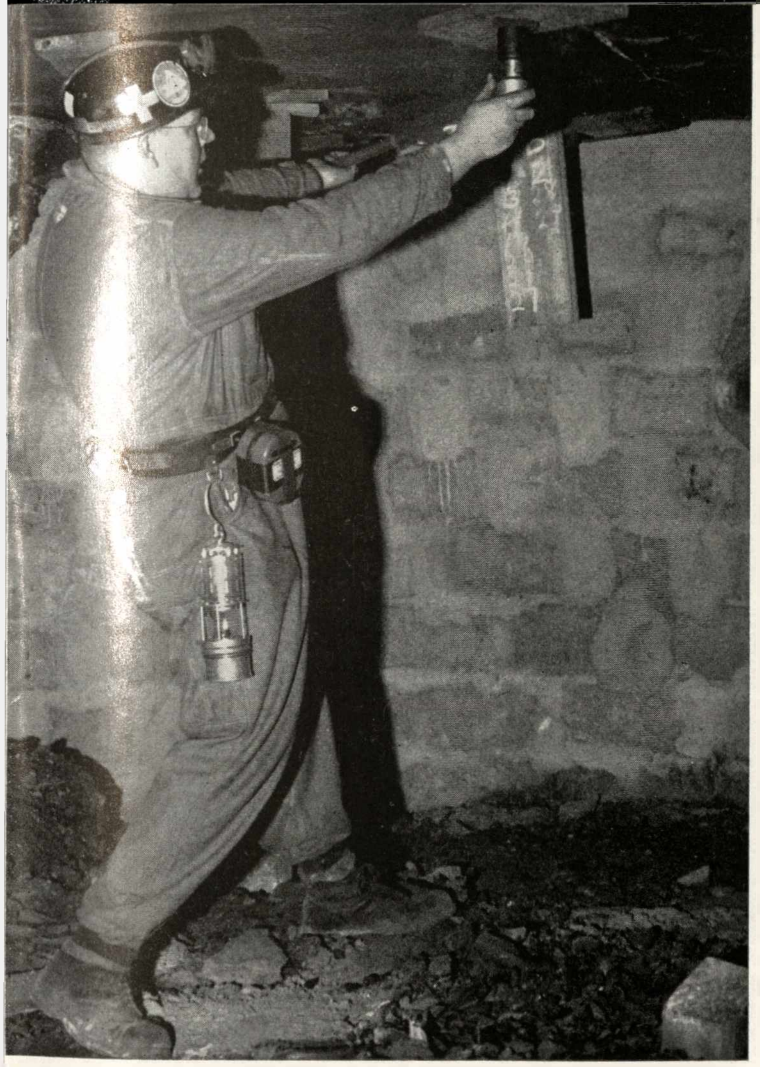
The Indiana Joint Committee for Coal Mine Safety is the guiding force in the industry's safety campaign. This committee is a cooperative effort between the mine operators, the United Mine Workers of America, the United States government and the State of Indiana.

Labor and management work together closely on the joint safety project. One of the committee's most noteworthy accomplishments was to modernize Indiana's mining code. The State Assembly, acting upon the committee's suggestions, enacted a new and modern set of mining laws.

Tangible results of efforts of the joint committee on safety are evident in a substantial reduction in the number of accidents, despite constantly increasing production. Without exception, the mines participating in this program have substantially improved their safety records. Indications are that even the existing fine records will continue to improve under the guidance of the Indiana Joint Committee for Coal Mine Safety.



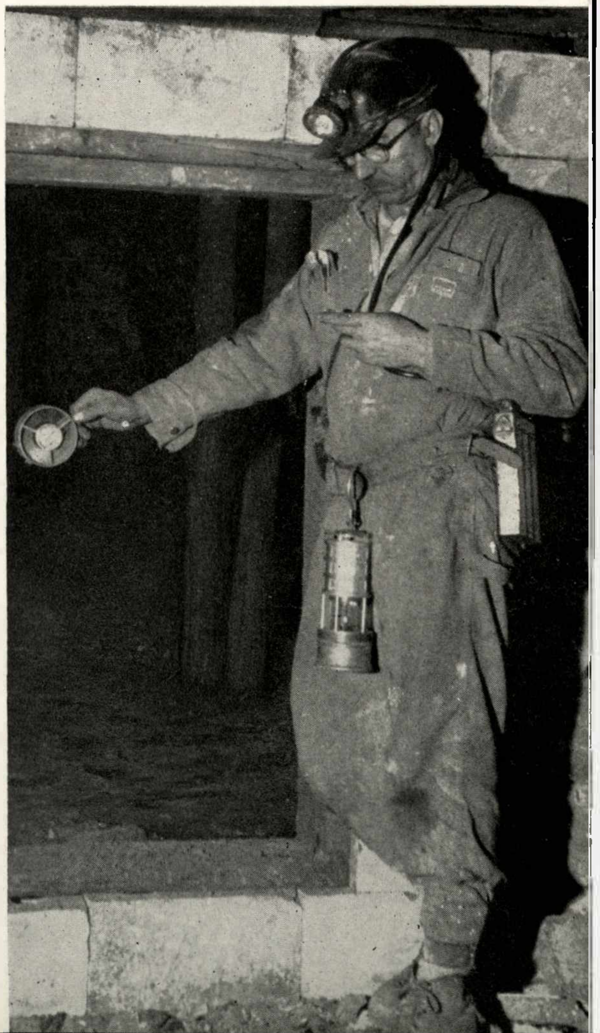
**Results of the Indiana coal industry's mine safety program have been outstanding. Through the vigorous efforts of the mine operators, the United Mine Workers, the U.S. Government and the State of Indiana, the hazards associated with coal mining are rapidly disappearing from Indiana mines.**



Efficient, well-trained mine rescue and first aid teams have saved many lives which might otherwise have been lost in coal mine accidents. Although first aid and rescue work are important phases of Indiana's mine safety program, the fundamental aim of the program is accident prevention. Training sessions and safety campaigns work to eliminate careless work habits and in the mines strictly enforced inspection procedures such as those illustrated here uncover potential hazards before the miners are exposed to them.

Roof fall accidents are prevented by careful tests and inspections. Here a Safety Engineer uses a torque wrench to measure the holding power of a roof bolt.

Another member of the safety team, usually called the "air-man", is responsible for maintaining adequate ventilation in an underground mine. Miners are not permitted to enter working places until the "air-man" has determined that the volume of fresh air circulating through the mine is adequate for safe and comfortable working conditions and that there are no toxic or explosive gases present.



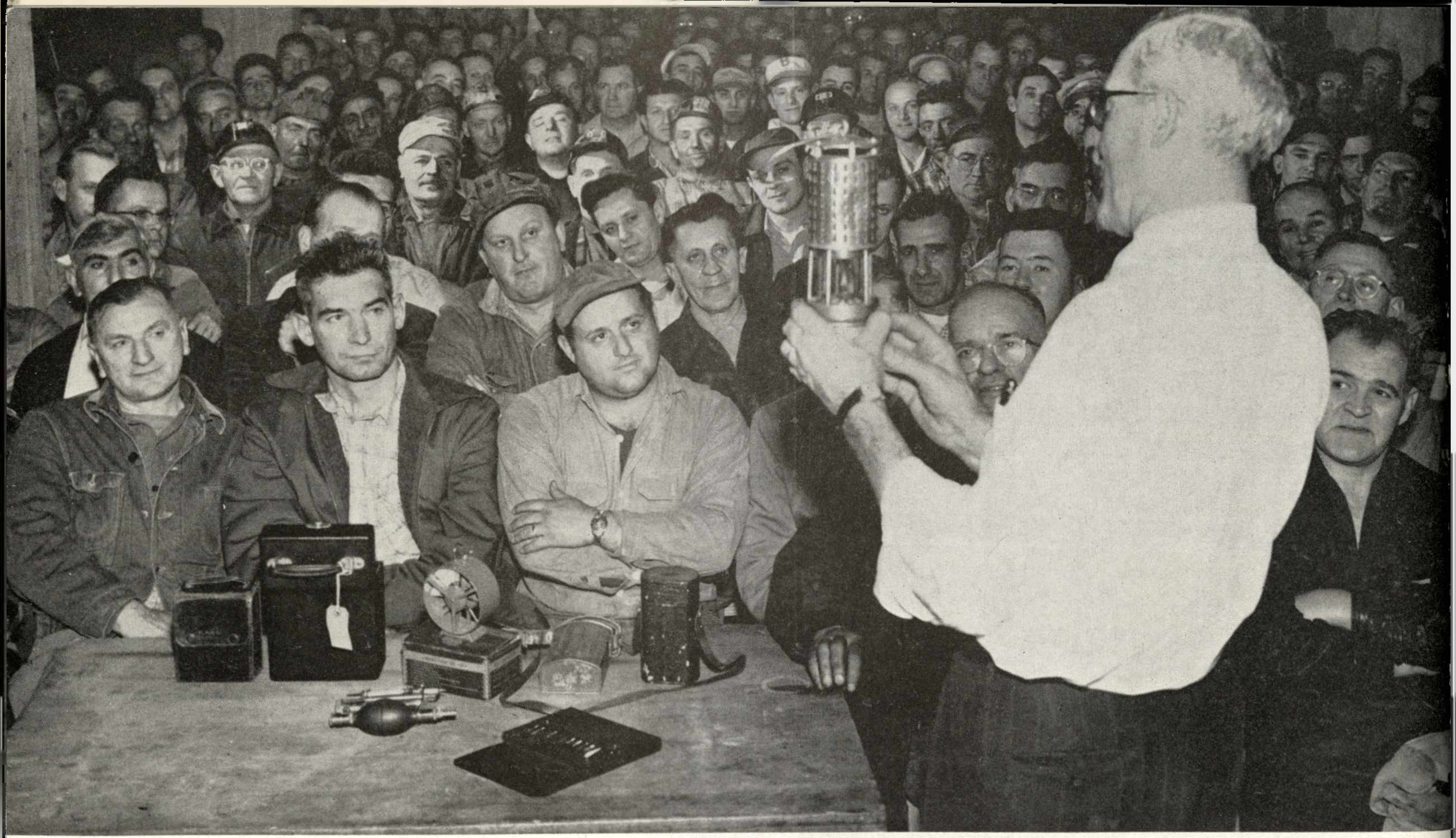


*Photo Courtesy U. S. Bureau of Mines.*

Men who work in coal mines are safety-conscious at all times. They are eager to study and apply accident-prevention equipment and techniques which make coal mines safer places in which to work. The slogan below, written by a member of the United Mine Workers and adopted as the official motto of Indiana's coal mine safety program, reflects the attitude and cooperative spirit of working coal miners toward the aims of the safety program.

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